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1. Report of the Auditor General for the year ended 31st March, 1914, Volume I, Parts A, B and A to L; Volume II, Parts M to U; Volume III, Parts V to Z. Presented by Hon. Mr. White, February 9, 1915.. .. .. ..*Printed for distribution and sessional papers.*

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2. The Public Accounts of Canada, for the fiscal year ended 31st March, 1914. Presented by Hon. Mr. White, February 9, 1915 .. .. ..*Printed for distribution and sessional papers.*

3. Estimates of sums required for the service of the Dominion for the year ending on 31st March, 1916. Presented by Hon. Mr. White, February 8, 1915.
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5. Further Supplementary Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1915. Presented by Hon. Mr. White, March 27, 1915.
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5*a*. Further Supplementary Estimates for year ending 31st March, 1916. Presented by Hon. Mr. White, March 31, 1915.. .. ..*Printed for distribution and sessional papers.*

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6. List of Shareholders in the Chartered Banks of the Dominion of Canada as on 31st December, 1914. Presented by Hon. Mr. White, February 9, 1915.
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7. Report on certified cheques, dividends, unclaimed balances and drafts or bills of exchange remaining unpaid in Chartered Banks of the Dominion of Canada, for five years and upwards prior to 31st December, 1913. Presented by Hon. Mr. White, April 10, 1915.
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8. Report of Superintendent of Insurance for year 1914. Presented by Hon. Mr. White, 1915.
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9. Abstract of Statement of Insurance Companies in Canada for year ended 31st December, 1914. Presented by Hon. Mr. White, 1914.
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10. Report of the Department of Trade and Commerce for the fiscal year ended 31st March, 1914: Part I.—Canadian Trade. Presented by Sir George Foster, 8th February, 1915.
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10*a*. Report of the Department of Trade and Commerce for the fiscal year ended 31st March, 1914: Part II.—Canadian Trade with (1) France, (2) Germany, (3) United Kingdom, and (4) United States. Presented by Sir George Foster, 8th February, 1915.
Printed for distribution and sessional papers.

10*b*. Report of the Department of Trade and Commerce for the fiscal year ended 31st March, 1914: Part III.—Canadian Trade with foreign countries (except France, Germany, the United Kingdom, and United States.) Presented by Sir George Foster, 8th February, 1915.. .. ..*Printed for distribution and sessional papers.*

10*c*. Report of the Department of Trade and Commerce, for the fiscal year ended 31st March, 1914, (Part IV, Miscellaneous Information.) Presented by Sir George Foster, March 27, 1915.. .. ..*Printed for distribution and sessional papers.*

10*d*. Report of the Board of Grain Commissioners for Canada. Presented by Sir George Foster, 1914... .. ..*Printed for distribution and sessional papers.*

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10*e*. Report of the Department of Trade and Commerce for the fiscal year ending 31st March, 1914. Part VI.—Subsidized Steamship Services, with statistics showing steamship traffic to 31st December, 1914, and Estimates for the fiscal year 1915-16. Presented by Sir George Foster, 1915.. .. ..*Printed for distribution and sessional papers.*

10*f*. Report of Trade and Commerce for fiscal year ended 31st March, 1914. (Part VII.—Trade of Foreign Countries, Treaties and Conventions.) Presented by Sir George Foster, 1915... .. ..*Printed for distribution and sessional papers.*

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11. Report of the Department of Customs for the year ended 31st March, 1914. Presented by Hon. Mr. Reid, February 11, 1915.. .. *Printed for distribution and sessional papers.*

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15. Report of the Minister of Agriculture for the Dominion of Canada, for the year ended 31st March, 1914. Presented by Hon. Mr. Burrell, February 8, 1915.
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15*b*. Report of the Veterinary Director General for the year ending 31st March, 1915. Presented by Hon. Mr. Burrell, 1915.. .. .. ..*Printed for distribution and sessional papers.*

16. Report of the Director and Officers of the Experimental Farms for the years ending 31st March, 1914. Presented by Hon. Mr. Burrell, March 1, 1915.
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17. Criminal Statistics for the year ended 30th September, 1913. (Appendix to the Report of the Minister of Trade and Commerce for the year 1913.) Presented by Sir George Foster, 1915.. .. ..*Printed for distribution and sessional papers.*

18. Return of By-elections for the House of Commons of Canada, held during the year 1914. Presented by Hon. Mr. Speaker, March 12, 1915.
Printed for distribution and sessional papers.

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19. Report of the Minister of Public Works on the works under his control for the fiscal year ended 31st March, 1914, Volume I. Presented by Hon. Mr. Rogers, February 8, 1915
Printed for distribution and sessional papers.

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20. Annual Report of the Department of Railways and Canals, for the fiscal period from 1st April, 1913, to 31st March, 1914. Presented by Hon. Mr. Cochrane, March 12.
Printed for distribution and sessional papers.

20*a*. Canal Statistics for the season of navigation, 1914. Presented by Hon. Mr. Cochrane, 9th April, 1915.. .. ..*Printed for distribution and sessional papers*

20*b*. Railway Statistics of the Dominion of Canada, for the year ended 30th June, 1914. Presented by Hon. Mr. Cochrane, March 12, 1915.
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20*c*. Ninth Report of the Board of Railway Commissioners for Canada, for the year ending 31st March, 1914. Presented by Hon. Mr. Cochrane, February 8, 1915.
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20*d*. Telephone Statistics of the Dominion of Canada, for the year ended 30th June, 1914. Presented by Hon. Mr. Cochrane, March 17, 1915.
Printed for distribution and sessional papers.

20*e*. Express Statistics of the Dominion of Canada for year ended 30th June, 1914. Presented by Hon. Mr. Cochrane, 1915... .. ..*Printed for distribution nad sessional papers.*

20*f*. Telegraph Statistics of the Dominion of Canada, for the year ended 30th June, 1914. Presented by Hon. Mr. Cochrane, March 17, 1915.
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21*b*. Report and evidence in connection with the Royal Commission appointed to investigate the disaster of the *Empress of Ireland*. Presented by Hon. Mr. Hazen, 1914.
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22. List of Shipping issued by the Department of Marine and Fisheries, being a list of vessels on the registry books of the Dominion of Canada on 31st December, 1914. Presented by Hon. Mr. Hazen, 1915... .. ..*Printed for distribution and sessional papers.*

23. Supplement to the Forty-seventh Annual Report of the Department of Marine and Fisheries for the fiscal year 1913-14—Steamboat Inspection Report. Presented by Hon. Mr. Hazen, March 3, 1915 .. ..*Printed for distribution and sessional papers.*

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25b. Annual Report of the Topographical Surveys Branch of the Department of the Interior, 1912-13. Presented by Hon. Mr. Roche, 1914.
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25c. Report of progress of stream measurements for calendar year of 1914. Presented by Hon. Mr. Roche, 1914.. .. ..*Printed for distribution and sessional papers.*

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25e. Report on Bow River Water Power and Storage Investigations seasons 1911-1912-1913. Presented by Hon. Mr. Burrell, 1915.. ..*Printed for distribution and sessional papers.*

25f. Report of the British Columbia Hydrographic Survey for the calendar year 1913. Presented by Hon. Mr. Burrell, 1915.. ...*Printed for distribution and sessional papers.*

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26. Summary Report of the Geological Survey, Department of Mines, for the calendar year 1913. Presented, 1915.. .. ..*Printed for distribution and sessional papers.*

26a. Summary Report of the Mines Branch for the calendar year 1913. Presented, 1914.
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27. Report of the Department of Indian Affairs for the year ended 31st March, 1914. Presented by Hon. Mr. Roche, 11th February, 1915.
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28. Report of the Royal Northwest Mounted Police, 1914. Presented by Hon. Sir Robert Borden, 8th February, 1915 .. ..*Printed for distribution and sessional papers.*

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29. Report of the Secretary of State of Canada for the year ended 31st March, 1914. Presented by Hon. Mr. Coderre, 9th February, 1915.
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29b. Report of the work of the Public Archives for the year 1913. Presented, 1915.
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30. The Civil Service List of Canada, 1914. Presented by Hon. Mr. Coderre, 9th February, 1915.. .. ..*Printed for distribution and sessional papers.*

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31. Sixth Annual Report of the Civil Service Commission of Canada for the year ended 31st August, 1914. Presented by Hon. Mr. Coderre, 19th March, 1915.
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32. Annual Report of the Department of Public Printing and Stationery for the year ended 31st March, 1914. Presented by Hon. Mr. Coderre, 6th April, 1915
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33. Report of the Secretary of State for External Affairs for the year ended 31st March, 1914. Presented by Sir Robert Borden, 18th February, 1915.
Printed for distribution and sessional papers.

34. Report of the Minister of Justice as to Penetentiaries of Canada, for the fiscal year ended 31st March, 1914. Presented, 1915.. .. .. ..*Printed for distribution and sessional papers.*

35. Report of the Militia Council for the Dominion of Canada, for the fiscal year ending 31st March, 1914. Presented by Hon. Mr. Hughes, 10th February, 1915.
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36. Report of the Department of Labour for the fiscal year ending 31st March, 1914. Presented by Hon. Mr. Crothers, 8th February, 1915.
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36a. Seventh Report of the Registrar of Boards of Conciliation and Investigation of the proceedings under "The Industrial Disputes Investigation Act, 1907," for the fiscal year ending 31st March, 1914. Presented by Hon. Mr. Crothers, 8th February, 1915.
Printed for distribution and sessional papers.

37. Tenth Annual Report of the Commissioners of the Transcontinental Railway, for the year ended 31st March, 1914. Presented by Hon. Mr. Cochrane, 8th February, 1915.
Printed for distribution and sessional papers.

37a. Interim Report of the Commissioners of the Transcontinental Railway, for the nine months ended 31st December, 1914. Presented by Hon. Mr. Cochrane, 15th February, 1915.. .. .. .

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45. Return to an Order of the House of the 20th April, 1914, for a copy of all letters, papers, tenders and other documents in regard to the purchase of any cars for the Intercolonial Railway during the years 1912 and 1913. Presented 9th February, 1915.—*Mr. Macdonald*.. .. .. .

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of convicts; dates of conviction; crime of which convicted; sentences passed; by whom sentenced; sentences commuted, and if so, to what. 3. For a return showing all persons in Canada, and each province, convicted during the above mentioned period of murder whose sentences have been mitigated, or who have received a free pardon, together with a statement of the offences of which they were severally convicted, with the name of convicts; dates of conviction; nature of offence; sentences; and extent of mitigation of sentences and dates. 4. For a return of instances, during the above mentioned period, in which appeal has been made on behalf of the persons convicted of capital offences to His Excellency, the Governor in Council, for the exercise of the Royal Prerogative of pardon, or mitigation of sentences, with the name of convicts; dates of conviction and place; crime of which convicted; sentences; dates of appeal; and the result. Presented 9th February, 1915.—*Mr. Wilson (Laval)*.. ..*Not printed.*

54. General Rules and Orders of the Exchequer Court of Canada made, respectively, on the 23rd September, 1914, and the 18th June, 1914. Presented by Hon. Mr. Coderre, 9th February, 1915.. .. ..*Not printed.*

54*a*. General Rules and Orders of the Exchequer Court of Canada made on the 15th February, 1915. Presented by Hon. Mr. Coderre, 16th March, 1915... .. ..*Not printed.*

55. Ordinances of the Yukon Territory passed by the Yukon Council in the year 1914. Presented by Hon. Mr. Coderre, 9th February, 1915... .. ..*Not printed.*

56. Return to an Order of the House of the 18th May, 1914, for a return showing the details of moneys paid to J. F. Farrington, $248.25; B. H. Smith, $469.50, and H. C. Dash, $182.40, as set forth in *Hansard* of this session, page 3071. Presented 9th February, 1915.—*Mr. McLean (Halifax)*... .. ..*Not printed.*

57. Return to an Order of the House of the 16th March, 1914, for a copy of instruction sent to Mr. Wm. Flynn, advocate, to hold investigations into charges made against employees of the Department of Marine and Fisheries in Bonaventure County, and reports made by him in such investigations. Presented 9th February, 1915.—*Mr. Marcil (Bonaventure)*.. .. ..*Not printed.*

58. Return to an Order of the House of the 27th April, 1914, for a copy of all documents bearing upon the application made to the Department of Marine and Fisheries for the dismissal of Ulric Dion, lightkeeper at St. Charles de Caplan, Quebec, and the appointment of Omer Arsenault in his place, and on the action taken by the Department in that connection. Presented 9th February, 1915.—*Mr. Marcil (Bonaventure).*
Not printed.

59. Return to an Order of the House of the 9th February, 1914, for a copy of all agreements made and entered into between the Department of Marine and Fisheries or the Government and Railway and Express Companies, including the Intercolonial Railway, relating to the transportation of fresh fish by fast freight or express, since the year 1906; also a copy of all guarantees given to railway and express companies by the Government or any Department thereof, relating to such transportation, together with a statement of all disbursements made by the Department of Marine and Fisheries each year under the terms of such agreements or guarantees, distinguishing between disbursements made on account of fast freight and disbursements made on account of express shipments; also the number of refrigerator cars, subject to guarantee, by Department of Marine and Fisheries, forwarded by fast freight from Mulgrave or Halifax to Montreal, each calendar year since 1906, and the number of tons of freight carried by such cars each year. Also the number of refrigerator express cars forwarded from said points, Mulgrave and Halifax to Montreal, up to December 31, 1913, under the terms of an agreement made since 1911, between the Department of Marine and Fisheries and the railway or express companies or both. Also the number of tons of fresh fish carried by express companies, prior to December 31, 1913, under the last mentioned agreement; and the amount paid up to December 31, 1913, by the Department of Marine and Fisheries, under the last mentioned agreement. Also the number of tons of fresh fish carried by express companies from Mulgrave and Halifax to points west since 1906, on which the Government paid one-third, but not under the terms of the said agreement made as aforesaid, since 1911. Presented 9th February, 1915.—*Mr. Sinclair*.. .. ..*Not printed*

60. Return to an Order of the House of the 20th April, 1914, for a return showing all the post offices in the several counties in the province of Nova Scotia for which a rent allowance, or a fuel fund, and light allowance is made, specifying the amount of such allowance in each case. Presented 9th February, 1914.—*Mr. Chisholm (Antigonish).*
Not printed.

61. Return to an Order of the House of the 16th March, 1914, for a copy of all correspondence, letters, telegrams, etc., in the year 1913, relating to the carrying of the mails between Grand River Falls and Grand River, county of Richmond, and the awarding of the contract to Malcolm McCuspic. Presented 9th February, 1915.—*Mr. Kyte.*
....*Not printed.*

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62. Return to an Order of the House of the 11th May, 1914, for a copy of all letters, telegrams, correspondence and memorials since the 1st day of November, 1911, relating to the post office at Johnstown, Richmond County, N.S., and to complaints against the present postmaster and recommendations for his dismissal. Presented 9th February, 1915.—*Mr. Kyte*.. .. .. .

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77. Return to an Order of the House of the 8th June, 1914, for a copy of all documents bearing on an application or applications made to the Superintendent General of Indian Affairs or the Department, on an amendment to the Indian Act to facilitate the sale of the Indian Reserve of Restigouche, Que., or on the acquiring otherwise of any portion or the whole of the said reserve for industrial or other purposes, and any answers given thereto. Presented 11th February, 1915.—*Mr. Marcil (Bonaventure).*
Not printed.

78. Return to an Order of the House of the 2nd February, 1914, for a return showing the names of the sailors who have been employed on the *Eureka* during the years 1910, 1911, 1912 and 1913. Presented 12th February, 1915.—*Mr. Boulay*.. .. .. ..*Not printed.*

79. Return to an Order of the House of the 15th April, 1914, for a return showing the total bond issue of the Canadian Northern Railway Company and its affiliated companies; and the total cost to date of the construction of the lines of railways comprising the Canadian Northern Railway system, including terminals, sidings, etc. Presented 12th February, 1915.—*Mr. Murphy*.. .. ..*Not printed.*

80. Return to an Order of the House of the 18th May, 1914, for a copy of all papers, documents, reports and evidence relative to the dismissal or proposed dismissal of W. A. Case of the Government Quarantine Service at Halifax, N.S. Presented 12th February, 1915.—*Mr. McLean (Halifax)* .. ..*Not printed.*

81. Return to an Order of the House of the 26th February, 1914, for a return showing:—1. The freight rates charged during the years 1912 and 1913, on wheat from Canadian ports to ports in the United Kingdom by the Canadian Pacific Railway Company's Steamship Lines, the Allan Steamship Line and the Canadian Northern Railway Company's Steamship Lines. 2. The profits made by the freight boats of the said several lines which carried wheat alone or with other freight. Presented 12th February, 1915. —*Sir James Aikins*.. .. ..*Not printed.*

82. Return to an Order of the House of the 16th February, 1914, for a copy of all reports, requests, petitions, memorials, letters, telegrams and other correspondence and documents relating to the removal, suspension or dismissal, by the management of the Intercolonial Railway, of Warren Carter and Frederick Avard, employees in the freight department of the Intercolonial Railway at Sackville, N.B.; and of all letters, telegrams and other correspondence in the Department of Railways and Canals, or in the railway offices at Moncton, or in any Department of Government, addressed to the Minister of Railways and Canals, or to any other member of the Government, or to any official of the Department of Railways and Canals, or of the Intercolonial Railway, by any person or persons in the county of Westmorland, N.B., in any manner relating to said employees and to the dispensing with their services, particularly of any letters sent to F. P. Brady, General Superintendent of the Intercolonial, by any party or parties in Sackville, N.B., or elsewhere, and of all replies to any such letters, correspondence or documents. Presented 12th February, 1915.—*Mr. Emmerson.*
Not printed.

83. Return to an Order of the House of the 23rd March, 1914, for a return showing:—1. What investigations and other work have been entrusted by the Government, or any Department thereof, to G. Howard Ferguson, member for the electoral division of the county of Grenville in the Legislative Assembly of the province of Ontario. 2. How much the said G. Howard Ferguson has been paid by the Government, or any Department thereof, for fees and disbursements since the 21st of September, 1911, and how much is still due and owing to him. 3. How much has been paid to the said G. Howard Ferguson by the Government or any Department thereof, since the 21st September, 1911, in connection with any other matter whatever. Presented 12th February, 1915.—*Mr. Proulx*.. .. ..*Not printed.*

84. Further Supplementary Return to an Order of the House of the 28th April, 1913, for a return showing a list of all the newspapers in Canada in which advertisements have been inserted by the Government, or any minister, officer or department thereof, between 10th October, 1911, and the present date, together with a statement of the gross amount paid therefor between the above dates to each of said newspapers or to the proprietors of the same. Presented 12th February, 1915.—*Mr. Sinclair*.. .. ..*Not printed.*

84*a*. Further Supplementary Return to an Order of the House of the 30th April, 1913, for a return showing a list of all the newspapers in Canada in which advertisements have been inserted by the Government, or any minister, officer or department thereof, between the 10th day of October, 1906, and 10th October, 1907, and between said dates in each of the years following up to the 10th October, 1911, together with a statement of the gross amount paid therefor for the years mentioned, to each of the said newspapers or the proprietors of the same. Presented 12th February, 1915.—*Mr. Thornton.*
Not printed.

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85. Partial Return to an Order of the House of the 4th March, 1914, for a return showing:—1. How many employees of the Federal Government of Canada, including all services and all departments, have been dismissed from 10th October, 1911, to the present date. 2. How many have resigned. 3. How many have deserted the service. 4. How many deserters have been punished. 5. How many new employees have been engaged or appointed by the present Government during the same period. Presented 12th February, 1915.—*Mr. Boivin*.. .. ..*Not printed.*

85*a*. Return to an Order of the House of the 4th March, 1914, for a return showing:—1. How many employees of the Federal Government of Canada, including all services and all departments, have been dismissed from 10th October, 1911, to the present date. 2. How many have resigned. 3. How many have deserted the service. 4. How many deserters have been punished. 5. How many new employees have been engaged or appointed by the present Government during the same period. Presented 4th March, 1915.—*Mr. Boivin*.. .. ..*Not printed.*

85*b*. Further Supplementary Return to an Order of the House of the 4th March, 1914, for a return showing:—1. How many employees of the Federal Government of Canada, including all services and all departments, have been dismissed from 10th October, 1911, to the present date. 2. How many have resigned. 3. How many have deserted the service. 4. How many deserters have been punished. 5. How many new employees have been engaged or appointed by the present Government during the same period. Presented 5th March, 1915.—*Mr. Boivin*.. .. ..*Not printed.*

85*c*. Further Supplementary Return to an Order of the House of the 4th March, 1914, for a return showing:—1. How many employees of the Federal Government of Canada, including all services and all departments, have been dismissed from 10th October, 1911, to the present date. 2. How many have resigned. 3. How many have deserted the service. 4. How many deserters have been punished. 5. How many new employees have been engaged or appointed by the present Government during the same period. Presented 12th March, 1915.—*Mr. Boivin*.. .. ..*Not printed.*

85*d*. Further Supplementary Return to an Order of the House of the 4th March, 1914, for a return showing:—1. How many employees of the Federal Government of Canada, including all services and all departments, have been dismissed from 10th October, 1911, to the present date. 2. How many have resigned. 3. How many have deserted the service. 4. How many deserters have been punished. 5. How many new employees have been engaged or appointed by the present Government during the same period. Presented 7th April, 1915.—*Mr. Boivin*.. .. ..*Not printed.*

86. Further Supplementary Return to an Order of the House of the 18th February, 1914, for a copy of all charges, complaints, memorials, correspondence and telegrams, not already produced, relating to officials in any department of the Government since 10th October, 1911, the number of officials dismissed, reports of investigations held in respect of such charges, items of expenditure and costs of each investigation, the names of persons appointed to office in the place of dismissed officials, and of all recommendations received in behalf of persons so appointed in the province of Prince Edward Island. Presented 12th February, 1915.—*Mr. Hughes (Kings, P.E.I.)*
Not printed.

87. Partial Return to an Order of the House of the 18th May, 1914, for a return showing in all cases in which Charles Seager, of Goderich, acted as Government Commissioner in the investigation of officials charged with partizanship, or other offences, from and including the year 1896 to the year 1900; and the names of all officials dismissed by reason of the reports of the said Charles Seager, the positions held by such officials, and when such dismissals took place; with a copy of the evidence taken in all such cases, together with the commissioners reports thereon, and also showing what fees were paid to the said Charles Seager for conducting such investigations. Presented 12th February, 1915.—*Mr. Clark (Bruce)*.. .. ..*Not printed.*

88. Return to an Order of the House of the 16th March, 1914, for a copy of all correspondence, letters, telegrams, complaints and of all other documents in any way referring to the operation of the salmon hatchery at North East Margaree, and the fish pond at Margaree Harbour from 1911 to date. Presented 15th February, 1915.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

89. Return to an Address to His Royal Highness the Governor General of the 11th May, 1914, for a copy of all letters, telegrams, Orders in Council, contracts, tenders, papers and other documents in possession of the Department of Public Works, and of the Department of Militia and Defence, relating to the construction of an armoury at Amherst, N.S. Presented 15th February, 1915.—*Mr. Sinclair*... .. ..*Not printed.*

90. Letters of the Honourable Louis P. Pelletier, M.P., and the Honourable Wilfrid B. Nantel, M.P., resigning their positions as Postmaster General and Minister of Inland Revenue, respectively, and letters of the Prime Minister in acknowledgment thereof. Presented by Sir Robert Borden, 15th February, 1915.. .. ..*Not printd.*

CONTENTS OF VOLUME 28—*Continued.*

91. Report of Board of Officers on boots supplied to the Canadian Expeditionary Force. Presented by Hon. Mr. Hughes, 15th February, 1915.. .. ..*Not printed.*

92. Regulations under "The Destructive Insect and Pest Act." Presented by Hon. Mr. Burrell, 16th February, 1915... .. ..*Not printed.*

93. Report on "The Agricultural Instruction Act," 1913-14, pursuant to Section 8 of the above named Act. Presented by Hon. Mr. Burrell, 16th February, 1915.
Printed for sessional papers only.

93*a*. Supplementary Return to an Address to His Royal Highness the Governor General of the 9th February, 1914, for a copy of all arrangements made between the Government and the various provinces under the Agricultural Instruction Act. Presented 19th February, 1915.—*Sir Wilfrid Laurier*.. .. ..*Not printed.*

93*b*. Return to an Order of the House of the 20th April, 1914, for a copy of all documents, correspondence, letters, petitions, reports, etc., exchanged between Dr. C. C. James, Mr. J. C. Chapais and each of the Provincial Ministers of Agriculture, in connection with the distribution and the administration of the federal subsidy granted to the provinces for agricultural purposes since the granting of same. Presented 23rd February, 1915. —*Mr. Lapointe (Kamouraska)*.. .. ..*Not printed.*

94. Return to an Order of the House of the 11th February, 1914, for a copy of all telegrams, correspondence, instructions, recommendations, and other documents that passed between the Shellfish Fishery Commission of 1913, and the Department of Marine and Fisheries, from the date of the appointment of said Commission to 31st December, 1913, excluding such documents as have been printed in the published report of said Commission. Presented 16th February, 1915.—*Mr. Sinclair*.. .. ..*Not printed.*

95. Return to an Order of the House of the 16th March, 1914, for a copy of all correspondence, tenders, telegrams, complaints and of all other documents in any way referring to the collecting of spawn for the Margaree Lobster Hatchery during the years 1911-12, 1912-13 and 1913-14. Presented 16th February, 1915.—*Mr. Chisholm (Inverness)*.
Not printed.

96. Return to an Order of the House of the 10th February, 1915, for a return showing the amount of coal imported into Alberta, Saskatchewan and Manitoba, respectively, from the United States during the year 1914; also the amount of duty collected in each of the said provinces during the same year. Presented 16th February, 1915.—*Mr. Buchanan*... .. ..*Not printed.*

97. Copy of the Eighth Joint Report of the Commissioners for the Demarcation of the Meridian of the 141st Degree of West Lngitude. Presented by Hon. Mr. Roche, 18th February, 1915.. .. ..*Not printed.*

98. Return to an Order of the House of the 20th April, 1914, for a copy of the agreement between the Government of Canada and the Canadian Pacific Railway Company at the time the special land grant was made whereby the Canadian Pacific Railway Company were enabled to get their land grant in one block for the purpose of establishing their present irrigation system east of Calgary, province of Alberta. Presented 18th February, 1915.—*Mr. Burnham*.. .. ..*Not printed.*

99. Return to an Order of the House of the 23rd March, 1914, for a copy of all letters, telegrams and other documents in connection with the sale of any timber on Parry Island, Parry Sound District, and of advertisements, agreements for purchase and any other documents connected with such sale or grant of timber to any person or persons. Presented 18th February, 1915.—*Mr. Arthurs*.. .. ..*Not rpinted.*

100. Return to an Order of the House of the 11th February, 1914, for a return showing reasons for the dismissal of Mr. Larivière, Dominion Lands Agent at Girouard; the date of his appointment and of dismissal and salary at time of dismissal; also the name of agent appointed in his place, with date of appointment and salary. Presented 18th February, 1915.—*Mr. Oliver*.. .. ..*Not printed.*

101. Annual Return respecting Trade Unions under Chapter 125, R.S.C., 1906. Presented by Hon. Mr. Coderre, 18th February, 1915.. .. ..*Not printed.*

102. A detailed statement of all bonds or securities registered in the Department of the Secretary of State of Canada, since last return (21st January, 1914) submitted to the Parliament of Canada under Section 32 of Chapter 19, of the Revised Statutes of Canada, 1906. Presented by Hon. Mr. Coderre, 18th February, 1915.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

103. Return to an Order of the House of the 9th February, 1914, for a copy of all petitions, memorials, letters, telegrams, papers, and documents received by any department of the Government of Canada, or any Minister of the Crown from any company, corporation, person or persons, requesting the removal of any customs duties upon wheat or wheat products entering Canada, or protesting against any diminution or removal of such custom's duties, and any replies thereto. Presented 18th February, 1915.—*Mr. Maclean (Halifax)*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

112. Return to an Order of the House of the 15th February, 1915, for a copy of all letters, telegrams, minutes of investigation and other documents relating to the dismissal of James Brennan, fireman Intercolonial Railway at Stellarton. Presented 25th February, 1915.—*Mr. Macdonald*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

120. Return to an Order of the House of the 15th February, 1915, for a return showing whether any exportations of food-stuffs have been made since 1st August last, to European countries, other than the United Kingdom, France and Belgium, and if so, their nature and what countries. Presented 25th February, 1915.—*Mr. Cockshutt.*
Not printed.

121. Return to an Order of the House of the 11th February, 1915, for a copy of the petition, papers, documents and letters in connection with the incorporation of the Dominion Trust Company, incorporated by Special Act of the Parliament of Canada in 1912, being Chapter 89 of 2 George V. Presented 25th February, 1915.—*Mr. Proulx.*
Not printed.

121*a*. Return to an Order of the House of the 11th February, 1915, for a copy of all the correspondence exchanged between the Department of Justice and the Government of the province of British Columbia, or any of its members, with regard to a certain Act passed by the Legislature of the said province in 1913, being Chapter 89 of 2 George V., entitled: "An Act respecting the Dominion Trust Company." Presented 4th March, 1915.—*Mr. Proulx*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

128*b*. Return of Orders in Council which have been published in the *Canada Gazette* and in the British Columbia *Gazette*, between 11th April, 1914, and 10th December, 1914, in accordance with provisions of Subsection (*d*) of Section 38 of the regulations for the survey, administration, disposal and management of Dominion Lands within the 40-mile railway belt in the province of British Columbia. Presented by Hon. Mr. Roche, 12th March, 1915.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

139a. Return to an Order of the House of the 24th February, 1915, for a copy of all letters, papers and documents relating to the dismissal of the following officers in Shelburne County, N.S.: Wm. L. Smith, lightkeeper, Baccaro, N.S.; J. A. Arechia, harbour master, Lower Wood Harbour, and J. C. Morrison, harbour master, Shelburne, N.S. Presented 16th March, 1915.—*Mr. Law*.. .. ..*Not printed.*

140. Return to an Order of the House of the 9th March, 1914, for a return showing:—1. The amounts of money expended by this Government in the county of Portneuf from the 1st of July, 1896, to the 21st September, 1911. 2. The nature of the work done in each parish. 3. In what year such work was executed, and what amount was expended in each case. Presented 4th March, 1915.—*Mr. Sevigny*.. .. ..*Not printed.*

141. Return to an Order of the House of the 22nd February, 1915, for a copy of all papers, petitions, declarations, affidavits, sworn statements, requests, certificates and all other documents in connection with the naturalization of F. P. Gutelius, General Manager of the Intercolonial Railway. Presented 4th March, 1915.—*Mr. Gauvreau*.. ..*Not printed.*

142. Report of the delegates appointed to represent the Government of Canada at the Eighth International Purity Congress, held under the auspices of the World's Purity League, at Kansas City, Mo., November 5th-9th, 1914. Presented by Sir Robert Borden, 4th March, 1915. *Not printed.*

143. Return to an Address to His Royal Highness the Governor General of the 22nd February, 1915, for a copy of all complaints to the Government of the killing of one American citizen and the shooting of another by militia men, in the waters of Lake Erie, and of all correspondence with regard to the same with the British Embassy and American authorities. Presented 5th March, 1915.—*Sir Wilfrid Laurier*.. .. .. ..*Not printed.*

144. Return to an Order of the House of the 24th February, 1915, for a return showing the amounts in detail paid to Ward Fisher, of Shelburne, N.S., fishery inspector, for the years 1912 and 1913, for salary, office expenses, travelling expenses, and all other expenses. Presented 5th March, 1915.—*Mr. Law*.. .. ..*Not printed.*

145. Return to an Order of the House of the 15th February, 1915, for a return showing the names and addresses of all persons in Yarmouth County to whom the bounty under the Fenian Raid Volunteer Bounty Act has been paid; the names and addresses of all persons from said county whose applications have been rejected, and a list giving names and addresses of all applicants from said county whose applications have not yet been disposed of. Presented 5th March, 1915.—*Mr. Law*.. .. ..*Not printed.*

146. Return to an Order of the House of the 19th February, 1915, for a return showing the names and post office addresses of all persons in Guysborough County, N.S., to whom the bounty under the Fenian Raid Volunteer Bounty Act has been paid; the names and post office addresses of all persons whose applications have been rejected, and the reason for such rejections; also the names and post office addresses of all persons whose applications have been received but have not yet been paid, distinguishing between those who have been dealt with and allowed, and such applications as have been received but not yet considered, if any. Presented 5th March, 1915.—*Mr. Sinclair.* *Not printed.*

147. Return to an Order of the House, of the 12th February, 1915, for a return showing:—1. How many applications for seed grain have been received from residents of the three prairie provinces since June, 1914? 2. How many bushels of grain were included in the applications? 3. How many acres of land were to be seeded by the grain applied for? 4. How many bushels of wheat, oats and barley, respectively, the Government has on hand with which to meet the applications? 5. If arrangements have been made under which the several Provincial Governments will assist in meeting the needs of the settlers for seed grain? Presented 8th March, 1915.—*Mr. McCraney*.. ..*Not printed.*

148. Return to an Order of the House, of the 2nd February, 1914, for a return showing the number of ships chartered by the Government or any department thereof since October, 1911, to go to Hudson's Bay or James Bay; the name of each and the tonnage; the name and residence of each commanding officer; what cargo each carried, and what portion was landed, and where, what was lost and where, and what returned; with the values in each case. Presented 8th March, 1915.—*Mr. Graham*.. .. .. ..*Not printed.*

148a. Return to an Order of the House of the 3rd March, 1915, for a return showing the number of ships employed by the Railway Department, the number of men hired on vessels and on shore, and the amount expended for supplies, men and transportation from 31st March, 1914, to 31st December, 1914, in connection with the Hudson Bay Railway expenditures. Presented 22nd March, 1915.—*Mr. Macdonald*..*Not printed.*

149. Return to an Address to His Royal Highness the Governor General, of the 9th February, 1914, for a copy of all correspondence since the 1st January last with regard to the calling of an Imperial Conference on the subject of naval defence. Presented 8th March, 1915.—*Sir Wilfrid Laurier*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

150. Return to an Order of the House, of the 11th February, 1915, for a return showing the names and addresses of all persons in Antigonish County to whom the bounty under the Fenian Raid Volunteer Bounty Act has been paid; the names and addresses of all persons from said county whose applications have been rejected, and a list giving names and addresses of all applications from said county whose applications have not yet been disposed of. Presented 8th March, 1915.—*Mr. Chisholm (Antigonish).*
Not printed.

151. Return to an Order of the House, of the 3rd March, 1915, for a return showing:—1. Who were the different officers commissioned to the 17th Nova Scotia Regiment at Valcartier before they sailed for England? 2. Who are now the commissioned officers of said regiment. Presented 8th March, 1915.—*Mr. Macdonald*.. .. ..*Not printed.*

152. Return to an Order of the House, of the 9th February, 1915, for a copy of all accounts of the transfer of the storm signal at Shippigan, N.B., from its former position on land to the public wharf, showing the total cost of said transfer during the months of October and November in 1911. Presented 8th March, 1915.—*Mr. Turgeon.*
Not printed.

153. Return to an Order of the House, of the 4th May, 1914, for a copy of all correspondence, telegrams, petitions, including the signatures of such petitions, and all other documents and papers in the possession of the Department of Trade and Commerce, or the minister of said department, or in the possession of the Prime Minister, relating to any application made between 1st November, 1913, and date hereof by parties in Nova Scotia asking for Government assistance towards the transportation of fresh fish between ports in Nova Scotia and the United States. Presented 9th March, 1915.—*Mr. Sinclair.*
Not printed.

154. Statement of Mr. H. C. Crowell, staff correspondent of the Halifax *Chronicle*, and correspondence in connection with statements appearing in the press referring to alleged ill-treatment of the 17th Regiment of Nova Scotia, at Salisbury Plains. Presented by Sir Robert Borden, 9th March, 1915.. .. ..*Not printed.*

155. Return to an Order of the House, of the 3rd March, 1915, for a return showing:—1. The estimated cost of fitting up the works of the Canadian Car and Foundry Company, Limited, at Amherst, N.S., for military purposes. 2. The rent or other remuneration being paid, or will be paid, this company for the use of its buildings. 3. Who are to supply the military provisions, including food for men, coal for heating and cooking, and food and other supplies for horses quartered on these premises, and at what prices. 4. Whether it is true that forms for tendering for such military supplies could only be obtained from the office of the sitting member for Cumberland County, and in several cases forms of tender were refused to applicants. 5. Whether the Government is aware that in the case of the supplying of hay, as alleged, not only Liberals were not allowed to tender for same, but supporters of the Government were informed they would not secure any part of the contract, if any of the hay to be supplied was to be purchased from a Liberal. Presented 11th March, 1915.—*Mr. Copp*.. .. .. ..*Not printed.*

156. Return to an Address to His Royal Highness the Governor General, of the 1st March, 1915, for a copy of all correspondence of the Imperial authorities on the subject of loans from the Imperial Treasury to the Canadian Government. Presented 11th March, 1915.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

157. Return to an Order of the House of the 3rd March, 1915, for a copy of all correspondence, recommendations, letters and telegrams relating to the appointment of H. W. Ingraham as Assistant Registrar of Alien Enemies at Sdyney, N.S., and to his dismissal from the said office. Presented 12th March, 1915.—*Mr. Kyte*.. .. ..*Not printed.*

158. Return to an Address to His Royal Highness the Governor General of the 11th February, 1915, for a copy of all correspondence relating to the purchase of, and payment by the Government for two submarines authorized by Order in Council dated the 7th August, 1914, and of any other Order or Orders in Council relating thereto; and also of all reports received by the Government or any department thereof referring to said submarines. Presented 12th March, 1915.—*Mr. Pugsley* .. ..*Printed for distribution only.*

158*a*. Supplementary Return to an Address to His Royal Highness the Governor General, of the 11th February, 1915, for a copy of all correspondence relating to the purchase of, and payment by the Government for two submarines authorized by Order in Council dated the 7th August, 1914, and of any other Order or Orders in Council relating thereto; and also of all reports received by the Government or any department thereof referring to said submarines. Presented 15th March, 1915.—*Mr. Pugsley.*
Printed for distribution only.

CONTENTS OF VOLUME 28—*Continued.*

158*b*. Further Supplementary Return to an Address to His Royal Highness the Governor General, of the 11th February, 1915, for a copy of all correspondence relating to the purchase of, and payment by the Government for two submarines authorized by Order in Council dated the 7th August, 1914, and of any other Order or Orders in Council relating thereto; and also of all reports received by the Government, or any department thereof, referring to said submarines. Presented 24th March, 1915.—*Mr. Pugsley.*
Printed for distribution only.

159. Return to an Order of the House of the 19th February, 1915, for a copy of all correspondence, telegrams, petitions, letters and all other documents in any way referring to the dismissal of Mr. Mallet, captain of the life-boat in the life-saving station at Cheticamp, and the appointment of his successor. Presented 12th March, 1915.—*Mr. Chisholm (Antigonish)*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

170. Return to an Order of the House of the 11th February, 1915, for a copy of all petitions, letters, telegrams and correspondence regarding a proposed daily mail service between Lower South River and South Side Harbour, Antigonish County, and improved postal accommodation for the residents of the last-named district. Presented 17th March, 1915.—*Mr. Chisholm (Antigonish)*.. .. ..*Not printed.*

171. Return to an Order of the House of the 1st March, 1915, for a copy of all letters, documents, telegrams, recommendations, petitions and other papers received by the Post Office Department since 1st January, 1914, relating to the contract for carrying the mails between Guysborough and Canso, N.S. Presented 18th March, 1915.—*Mr. Sinclair*.. .. ..*Not printed.*

172. Return to an Order of the House of the 22nd February, 1915,-for a return showing:1. The total number of employees, both permanent and temporary, at the following post offices: Montreal, Toronto, Winnipeg, Halifax, Quebec, St. John, N.B., and Vancouver. 2. The total amount of salaries paid in each case. 3. The total number of employees, and the amount of salaries paid in the above offices on the 1st of October, 1911. Presented 18th March, 1915.—*Mr. Lemieux*.. .. ..*Not printed.*

173. Return to an Order of the House of the 19th February, 1915, for a copy of all correspondence, telegrams, letters, petitions and documents of all kinds in any way referring to a proposed change in the mail route from Inverness railway station to Margaree Harbour. Presented 18th March, 1915.—*Mr. Chisholm (Inverness)*.. ..*Not printed.*

174. Return to an Order of the House of the 8th March, 1915, for a return showing:—1. From how many firms or individuals the Government, or any department thereof, has ordered soldiers uniforms since the 1st of July, 1914. 2. The names of these firms. 3. How many Oliver equipments have been ordered from each firm. 4. How many of these uniforms each firm has delivered up to date. 5. How many each firm has yet to deliver. 6. The price each firm is receiving for these uniforms. Presented 18th March, 1915.—*Mr. Murphy*.. .. ..*Not printed.*

175. Return to an Order of the House of the 8th March, 1915, for a return showing:—1. From how many firms or individuals the Government, or any department thereof, has ordered Oliver equipments since the 1st of July, 1914? 2. The names of these firms? 3. How many Oliver equipments have been ordered from each firm? 4. How many each firm has delivered up to date? 5. How many each firm has yet to deliver? 6. The price each firm is receiving for these Oliver equipments? Presented 18th March, 1915.—*Mr. Murphy*.. .. ..*Not printed.*

176. Return to an Order of the House of the 11th March, 1915, for a copy of all letters, correspondence, etc., relating to the appointment of William Gore Foster, of Dartmouth, N.S., to the position of Inspector of Indian Reserves. Presented 18th March, 1915.—*Mr. Carroll*.. .. ..*Not printed.*

177. Return to an Order of the House of the 15th February, 1915, for a copy of all letters, telegrams, correspondence, leases, and other documents relating to the cutting of lumber by Mr. B. F. Smith, and others, from the so-called Tobique Indian Reserve in the province of New Brunswick since the twelfth day of March, A.D. 1914, and also of all agreements, offers and promises made either by the said B. F. Smith or the Department of Indian Affairs, with reference to the sale or disposal of any of the said Tobique Indian Reserve since the said date, or any logs or lumber cut thereon. 2. Also a statement of all lumber cut by the said B. F. Smith from the said reserve, the rates of stumpage charged, and the amounts actually paid thereon from the first day of January, 1912, down to the date hereof. Presented 18th March, 1915.—*Mr. Carvell.* *Not printed.*

178. Return to an Order of the House of the 8th March, 1915, for a return showing:—1. The number of customs officers employed at the customs port of Masonville, Quebec, on 20th September, 1911. 2. The names of these officers. 3. The salary each one received. 4. The total amount of salaries paid the officers at this port. 5. The number of customs officers employed at the port of Masonville at the present time. 6. The names of these officers. 7. The salary each one receives. 8. The total amount of salaries paid to the officers at this port. Presented 18th March, 1915.—*Mr. Kay*... ..*Not printed.*

179. Return to an Order of the House of the 8th March, 1915, for a return showing:—1. The number of customs officers employed at the customs port of Highwater, Quebec, on 20th September, 1911. 2. The names of these officers. 3. The salary each one received. 4. The total amount of salaries paid the officers at this port. 5. The number of customs officers employed at the port of Highwater at the present time. 6. The names of these officers. 7. The salary each one receives. 8. The total amount of salaries paid to the officers at this port. Presented 18th March, 1915.—*Mr. Kay*... ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

180. Return to an Order of the House of the 8th March, 1915, for a return showing:—1. The number of customs officers employed at the customs port of Abercorn, Quebec, on 20th September, 1911. 2. The names of these officers. 3. The salary each one received. 4. The total amount of salaries paid the officers at this port. 5. The number of customs officers employed at the port of Abercorn at the present time. 6. The names of these officers. 7. The salary each one receives. 8. The total amount of salaries paid to the officers at this port. Presented 18th March, 1915.—*Mr. Kay*... ..*Not printed.*

181. Return to an Order of the House, of the 1st March, 1915, for a copy of all petitions, letters, communications and other documents relating to or bearing upon the dismissal of Leonard Hutchinson, chief keeper at Dorchester penintentiary. Presented 18th March, 1915.—*Mr. Copp*.. .. ..*Not printed.*

182. Return to an Order of the House of the 22nd February, 1915, for a copy of all letters, telegrams and papers generally concerning the proposed construction of a bridge to connect Isle Perrot with the mainland at Vaudreuil. Presented 18th March, 1915.—*Mr. Boyer*... .. ..*Not printed.*

182a. Return to an Order of the House of the 22nd February, 1915, for a copy of all letters, telegrams and papers generally concerning the proposed construction of a bridge between the Island of Montreal and the Mainland at Vaudreuil. Presented 18th March, 1915.—*Mr. Boyer* .. ..*Not printed.*

183. Return to an Order of the House of the 22nd February, 1915, for a return showing:—1. What properties have been acquired by the Government in the City of Regina since 21st September, 1911? 2. The descriptions of such properties by metes and bounds? 3. For what purposes such properties were acquired? 4. From whom such properties were purchased? 5. The total price and the price per foot paid for each property? 6. If any such property was acquired by expropriation, what tribunal determined the price to be paid for any property so expropriated? 7. The dates on which any such properties were acquired? Presented 18th March, 1915.—*Mr. Martin* (*Regina*).

184. Return to an Order of the House of the 19th February, 1915, for a copy of all letters, telegrams, memoranda, pay-lists, recommendations and any other documents whatsoever in any wise appertaining to the construction of a wharf at Lower Burlington, in the County of Hants. Presented 18th March, 1915.—*Mr. Chisholm* (*Inverness*).
Not printed.

185. Return to an Order of the House of the 24th February, 1915, for a copy of pay-rolls and all correspondence and vouchers in connection with the repairs to Jordan breakwater, Shelburne county, for which Leander McKenzie was contractor of works or foreman. Presented 18th March, 1915.—*Mr. Law* .. ..*Not printed.*

186. Return to an Order of the House of the 24th February, 1915, for a copy of all letters, telegrams, correspondence and pay-rolls in connection with repairs and extension of breakwater at Bluff Head, Yarmouth county, N.S., during year 1914. Presented 18th March, 1915.—*Mr. Law*.. .. ..*Not printed.*

187. Return to an Order of the House of the 22nd February, 1915, for a return showing the amounts expended by the Public Works Department in the County of Inverness each year from 1896 down to 1915. Presented 18th March, 1915.—*Mr. Chisholm* (*Inverness*).. .. ..*Not printed.*

188. Return to an Order of the House of the 24th February, 1915, for a copy of all letters, telegrams, correspondence and pay-sheets in connection with the repairs and other work on the breakwater at Sandford, Yarmouth County, N.S., during the year 1914. Presented 18th March, 1915.—*Mr. Law*.. .. ..*Not printed.*

189. Return to an Order of the House of the 1st March, 1915, for a copy of all papers, letters, petitions and other documents relating to a mail contract with David D. Heard & Sons, between Whitby and Grand Trunk Railway station, or with one John Gimblet, Whitby. Presented 19th March, 1915.—*Mr. Pardee*.. .. ..*Not printed.*

190. Copies of Reports of the Committee of the Privy Council, approved by His Royal Highness the Governor General, relating to certain advances made to the Canadian Northern Railway Company and the Grand Trunk Pacific Railway Company, respectively, together with copies of agreements made between the said companies and His Majesty. Presented by Hon. Mr. White, 19th March, 1915.. .. ..*Not printed.*

191. Return to an Order of the House of the 11th February, 1915, for a copy of all tenders received by the Post Office Department for the mail service between Caraquet and Tracadie, Gloucester County, N.B., on the 15th day of January last, with the names of the tenderers, the respective amounts of the tenders, and the name of the new contractor. Presented 19th March, 1915.—*Mr. Turgeon*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

192. Return to an Order of the House of the 8th March, 1915, for a return showing:—1. The fractional areas of homestead lands or otherwise in the province of Saskatchewan sold in the year 1914. 2. The name of the purchaser, and the price paid in each case. Presented 22nd March, 1915.—*Mr. Martin (Regina)*.. .. ..*Not printed.*

193. Return to an Order of the House of the 25th February, 1915, for a return showing, in reference to the answer to question No. 6 of 9th February, and answered 15th February as per page 161 unrevised *Hansard*, the cost of furnishing the Government offices in each of the said buildings. Presented 22nd March, 1915.—*Mr. Turriff.*
Not printed.

194. Return to an Order of the House of the 1st March, 1915, for a return showing the amount of railway subsidies paid in the county of Inverness since 1896, to date, and the dates on which such subsidies were paid. Presented 22nd March, 1915.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

195. Return to an Order of the House of the 1st March, 1915, for a copy of all letters, papers, telegrams and other documents relating to the purchase or lease of the railway from New Glasgow to Thorburn, in the county of Pictou, known as the Vale Railway, from the Acadia Coal Company, since January, 1911, to date. Presented 22nd March, 1915. —*Mr. Macdonold*.. .. ..*Not printed.*

196. Return to an Order of the House of the 1st March, 1915, for a copy of all papers, letters, telegrams, correspondence, contracts, etc., in connection with the sale of the hay grown or the lease of certain tracts of land belonging to the Intercolonial Railway, upon which hay is grown, and which are contiguous to the properties of Charles Lavoie, Cléophas Leclerc and Joseph Parent of the Parish of Bic, county of Rimouski. Presented 22nd March, 1915.—*Mr. Lapointe (Kamouraska)*.. .. ..*Not printed.*

197. Return to an Order of the House of the 3rd March, 1915, for a copy of all letters, papers, telegrams, evidence taken at investigations, reports and all other documents relating to the suspension or other action in regard to the charge of drunkeness against Newton Hopper, conductor on the Intercolonial Railway, and to his subsequent reinstatement. Presented 22nd March, 1915.—*Mr. Macdonald*.. .. ..*Not printed.*

198. Return to an Order of the House of the 1st March, 1915, for a copy of all letters, telegrams and other papers relating to the dismissal of Bruce Wiswell, as sectionman on the Intercolonial Railway at Stellarton, Nova Scotia. Presented 22nd March, 1915.— *Mr. Macdonald*.. .. ..*Not printed.*

199. Return to an Order of the House of the 22nd February, 1915, for a return showing:— 1. The inward tonnage freight, and also the outward tonnage freight respectively, at Loggieville station of the Intercolonial Railway for each month of 1914, and also for the month of January, 1915. 2. The inward tonnage freight, and the outward tonnage freight at Chatham station, on the Intercolonial Railway for each month of 1914, and also for the month of January, 1915. 3. The inward tonnage freight, and the outward tonnage freight at Newcastle station on the Intercolonial Railway for each month of 1914, and also for the month of January, 1915. 4. The local and through passenger traffic to and through each of the above stations, respectively, during each of the months above mentioned. Presented 22nd March, 1915.—*Mr. Loggie.*
Not printed.

200. Return to an Order of the House of the 15th February, 1915, for a copy of all letters, telegrams and correspondence had by Margaret Lynch, or any person representing her, with reference to the expropriation of certain land beolnging to the said Margaret Lynch in the city of Fredericton, province of New Brunswick, by the Intercolonial Railway, and also of all letters, telegrams and correspondence had with F. P. Gutelius or any other official of the Intercolonial Railway with reference thereto. Presented 22nd March, 1915.—*Mr. Carvell*.. .. ..*Not printed.*

201. Return to an Order of the House of the 3rd March, 1915, for a copy of all documents bearing on the payment made to C. R. Scoles, New Carlisle, Quebec, in July, 1914, of balance of subsidy voted to the Atlantic and Lake Superior Railway on the recommendation of the Financial Comptroller. Presented 22nd March, 1915.—*Mr. Marcil.*
Not printed.

202. Return to an Order of the House of the 1st March, 1915, for a copy of all letters, telegrams, correspondence and reports relating to the purchase of the New Brunswick and Prince Edward Island Railway, extending from Sackville to Cape Tormentine, county of Westmorland. Presented 22nd March, 1915.—*Mr. Copp*.. .. ..*Not printed.*

203. Return to an Order of the House of the 1st March, 1915, for a copy of the tariff on flour shipments now in force on the Quebec, Oriental Railway and the Atlantic, Quebec and Western Railway. Presented 22nd March, 1915.—*Mr. Marcil*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

204. Return to an Order of the House of the 22nd February, 1915, for a copy of all petitions, correspondence, complaints, reports and other documents relating to the dismissal of Alfred H. Bonnyman, postmaster of Mattatall Lake, in the county of Colchester, N.S. Presented 24th March, 1915.—*Mr. Sinclair*.. .. ..*Not printed.*

205. Return to an Address to His Royal Highness the Governor General, of the 1st March, 1915, for a copy of all correspondence, documents, charges, evidence, findings and Orders in Council in reference to the dismissal of John Thomas, postmaster at Hammond's Plain, Halifax County, N.S. Presented 24th March, 1915.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

205a. Supplementary Return to an Address to His Royal Highness the Governor General, of the 1st March, 1915, for a copy of all correspondence, documents, charges, evidence, findings and Orders in Council in reference to the dismissal of John Thomas, postmaster at Hammond's Plain, Halifax County, N.S. Presented 8th April, 1915.—*Mr. Maclean (Halifax)*... .. ..*Not printed.*

206. Certified copy of a Report of the Committee ofthe Privy Council, approved by His Royal Highness the Governor General, with reference to the question of providing adequate pensionary assistance for officers and men disabled or partially disabled on active service or for the dependents of such officers and men should they be killed on active service. Presented by Sir Robert Borden, 24th March, 1915... .. .. *Not printed.*

207. Return to an Order of the House of the 8th March, 1915, for a return showing:—1. From how many firms or private individuals the Government, or any department of the Government has ordered saddles since the 1st of July, 1914? 2. The names of these firms? 3. How many saddles have been ordered from each firm? 4. How many saddles each firm has delivered up to date? 5. How many saddles each firm has yet to deliver? 6. The price each firm is receiving for these saddles? Presented 26th March, 1915.—*Mr. Murphy*.. .. ..*Not printed.*

208. Return to an Order of the House of the 8th March, 1915, for a copy of all correspondence, letters, telegrams and other documents relating to the dismissal of Mr. P. B. Hurlbert, postmaster at Springdale, Yarmouth County, N.S., and the removal of the office. Presented 30th March, 1915.—*Mr. Law*.. .. ..*Not printed.*

209 Return to an Order of the House of the 8th March, 1915, for a copy of all letters, petitions, telegrams and correspondence between the Hon. L. P. Pelletier, ex-Postmaster General and any person or persons of the county of Lévis, which during the month of April, 1912, had any connection with the appointment of G. A. Marois to a position in the customs office at Quebec, and the appointment of J. E. Gingras as postmaster of St. Romuald and Etchemin. Presented 30th March, 1915.—*Mr. Bourassa.*
Not printed.

210. Return to an Order of the House of the 22nd February, 1915, for a copy of all letters, telegrams, petitions and documents of all kinds in possession of the Post Office Department, referring in any way to the conduct of the postmaster at Grand Etang since his appointment until the present date. Presented 30th March, 1915.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

211. Return to an Order of the House of the 1st March, 1915, for a copy of all telegrams, letters, papers, documents, evidence and reports, in connection with the dismissal of Charles H. Marshall as postmaster at Nanton, Alberta. Presented 30th March, 1915.—*Mr. Warwick*.. .. ..*Not printed.*

212. Return to an Order of the House of the 1st March, 1915, for a copy of the report of the officer in charge of the lobster hatchery at Port Daniel West, and of the report of the inspection thereof for the season 1914. Presented 31st March, 1915.—*Mr. Marcil.*
Not printed.

213. Return to an Order of the House of the 24th February, 1915, for a copy of all correspondence, petitions, documents, etc., in connection with a petition of Donald Williams and others in respect to the regulation of fish traps in Green Harbour and vicinity. Presented 31st March, 1915.—*Mr. Law*.. .. ..*Not printed.*

214. Return to an Order of the House of the 9th February, 1915, for a copy of all correspondence, petitions, departmental recommendations and other papers and documents in the Department of Marine and Fisheries relating to the definition of a "coasting voyage," as defined in the Canada Shipping Act since the revision of the statutes in 1886. Presented 1st April, 1915.—*Mr. Sinclair*.. .. ..*Not printed.*

215. Return to an Order of the House of the 1st March, 1915, for a copy of all advertisements, tenders, contracts, vouchers, letters, documents, etc., relating to the establishment of the ferry service between the City of Halifax and Dartmouth, N.S., for the employees of the Marine and Fisheries Department at Halifax, N.S. Presented 1st April, 1915.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

216. Return to an Order of the House of the 24th February, 1915, for a copy of all pay-rolls, vouchers in detail, correspondence and all other documents in connection with the following public wharves in Shelburne; breakwater or wharf at East Green Harbour; shed on public wharf at Shelburne, and repairs to Gunning Cove wharf. Presented 1st April, 1915.—*Mr. Law*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

228. Return to an Address to His Royal Highness the Governor General of the 19th February, 1915, for a copy of all Orders in Council, letters and telegrams exchanged between the Dominion Government and the several provinces, concerning the proposed transfer of fisheries in tidal waters from the Provincial to the Federal control. Presented 1st April, 1915.—*Mr. Lemieux*.. .. ..*Not printed.*

229. Return to an Order of the House of the 4th March, 1915, for a copy of all correspondence exchanged between the Government of Canada, or any minister or official thereof, in regard to the control of fisheries in Quebec province, as well as of all documents bearing on that question, together with a list of licenses granted by either Governments for the present year. Presented 1st April, 1915.—*Mr. Marcil*.. .. ..*Not printed.*

230. Return to an Order of the House of the 24th February, 1915, for a copy of all correspondence, letters, telegrams and petitions relating to the appointment of Alfred Bishop as farm foreman, or in any other capacity at the experimental station at Kentville, Nova Scotia. Presented 1st April, 1915.—*Mr. Kyte*.. .. ..*Not printed.*

231. Return to an Address of the 10th March, 1915, showing copies of all correspondence, telegrams and documents exchanged between the Department of Marine and Fisheries and the Minister of the Naval Service and the Department of Colonization, Mines and Fisheries of the province of Quebec, relating to the rescinding of the prohibition of net fishing in the waters of the Lakes of Two Mountains, St. Francis and St. Louis, as per Order in Council (197) passed in Ottawa, Thursday, 28th day of January, 1915.—(*Senate*).. .. ..

CONTENTS OF VOLUME 28—*Continued.*

239. Return to an Address to His Royal Highness the Governor General, of the 23rd February, 1915, for a copy of all letters, telegrams, reports, recommendations, Orders in Council and all other documents and papers in connection with rewards to the officers and crews of steamers *John L. Cann* and *Westport III*, for their heroic efforts in saving the passengers and crews of ss. *Cobequid*, wrecked on Trinity Lodge, 13th January, 1914. Presented 7th April, 1915.—*Mr. Law*.. .. ..*Not printed.*

240. Return to an Order of the House of the 29th March, 1915, for a copy of all documents, letters, telegrams, reports, etc., relating to the dismissal of Alexandre Blais, of the city of Lévis, from the position of customs officer at Bradore Bay, and the appointment of his successor or successors. Presented 7th April, 1915.—*Mr. Bourassa*.. ..*Not printed.*

241. A Return to an Address of the Senate dated 18th March, 1915, for:—1. A return showing all appointments to the Civil Service, Department of the Interior, in that area contained in the present constituencies of Medicine Hat and Macleod, giving names, date of appointment, how appointed, and salaries from the year 1896 to the present date. 2. Also, all vacancies by death, resignation or dismissal, giving name, date, length of service and cause of dismissal in the same area and during the same period.—(*Senate*). *Not printed.*

242. Return to an Order of the House of the 1st March, 1915, for a copy of charges made against J. Herbert Sweetman, customs officer at Port Daniel Centre, Quebec, which brought about his dismissal; and also of charges against Velson Horie, lighthouse keeper at Port Daniel West, Quebec, which brought about his dismissal. Presented 8th April, 1915.—*Mr. Marcil (Bonaventure)*.. .. .. *Not printed.*

243. Return to an Order of the House of the 22nd February, 1915, for a copy of all correspondence, recommendations, petitions, contracts, tenders and other papers and documents in any way connected with the letting of the contract for carrying the mails between Guysborough and Erinville, N.S. Presented 8th April, 1915.—*Mr. Sinclair.* *Not printed.*

244. Return to an Order of the House of the 10th March, 1915, for a copy of all reports, petitions, letters, telegrams and other documents in connection with the dismissal of W. M. Thomson from the postmastership at Fort Qu'Appelle, and of any petition or petitions for his reinstatement, and of all correspondence in connection therewith. Presented 8th April, 1915.—*Mr. Thomson (Qu'Appelle)*.. .. ..*Not printed*

245. Return to an Order of the House of the 22nd March, 1915, for a copy of all letters, telegrams, correspondence and petitions received in the Post Office Department, in any way referring to the calling of tenders for the Antigonish-Sherbrooke mail service, which tenders were opened or due at the Post Office Department on the 11th December last; and of all representations or requests, recommending or suggesting that new tenders should be invited as was done early in February last. Presented 8th April, 1915. —*Mr. Chisholm (Inverness)*... .. ..*Not printed.*

246. Return to an Order of the House of the 3rd March, 1915, for a copy of all letters, telegrams, papers and other documents in regard to a proposed rural mail delivery service between Pictou and Saltsprings, Pictou county, and as to the arrangements for the existing service between those points. Presented 8th April, 1915.—*Mr. Macdonald.* *Not printed.*

247. Return to an Address of His Royal Highness the Governor General, of the 1st March, 1915, for a copy of all letters, telegrams, reports, recommendations, Orders in Council, and all other documents and papers whatsoever relating to or in any wise connected with the establishment of rural mail routes and deliveries from Bridgetown to Granville Ferry, county of Annapolis, and especially of all letters, telegrams, reports, recommendations and documents relating to the closing of the post offices at Belleisle, Upper Granville, and the establishment of the post office at Granville Centre, all in the county of Annapolis. Presented 8th April, 1915.—*Mr. Macdonald*.. .. ..*Not printed.*

248. Return to an Order of the House of the 22nd February, 1915, for a copy of all telegrams, letters, reports, petitions and all other documents in any way referring to the proposed line of railway from Orangedale to Cheticamp. Presented 9th April, 1915.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

249. Return to an Order of the House of the 11th March, 1915, for a copy of all documents, investigations, reports, correspondence, etc., relating to the burning of certain buildings oelonging to the Trois Pistoles Pulp and Lumber Company and to André Leblond, near Tobin station, on the Intercolonial Railway. Presented 9th April, 1915.—*Mr. Lapointe (Kamouraska)*.. .. ..*Not printed.*

250. Return to an Order of the House of the 18th March, 1915, for a return showing the names of all officials, assistants and clerks, employed in the railway offices at Moncton, N.B., and the salary paid to each; also the names of officials formerly employed in said offices who have been retired on superannuation allowance, and the amount of retiring allowance being paid to each. Presented 9th April, 1915.—*Mr. Copp*.. ..*Not printed.*

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251. Return to an Order of the House of the 24th March, 1915, for a return showing the names of all persons from whom lands have been purchased, the quantity of land so acquired, and the amount paid therefor, in connection with the Dartmouth and Dean's Post Office Branch of the Intercolonial Railway since the date of return numbered 128 made to Parliament at the last regular session thereof. Presented 9th April, 1915.—*Mr. Maclean (Halifax)*.. .. .. .

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260*b*. Return to an Order of the House of the 8th March, 1915, for a return showing:—1. From how many firms or private individuals the Government or any department of the Government, has ordered service shirts since the 1st of July, 1914? 2 The names of these firms? 3. How many service shirts have been ordered from each firm? 4. How many each firm has delivered up to date? 5. How many each firm has yet to deliver? 6. The price each firm is receiving for these service shirts? Presented 10th April, 1915.—*Mr. Carroll*.. .. .. .

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267. Return to an Order of the House of the 17th March, 1915, for a copy of all petitions, letters, documents, etc., between persons in the province of Nova Scotia and the Department of Trade and Commerce since 1st August last, with regard to Atlantic ocean freight rates on subsidized steamers or otherwise. Presented 10th April, 1915.—*Mr. Maclean (Halifax)*.. .. .. .

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278. Return to an Order of the House of the 8th April, 1915, for a return showing:—1. The number of employees connected with the administration of the Three Rivers post office on the 21st September, 1911, and the annual amount paid in salaries at that date for such service. 2. The number of employees connected with the administration of the Three Rivers post office at the present date, and the amount of the annual salaries paid for such service. 3. The number of employees in the Customs Department for Three Rivers on the 21st September, 1911, and the amount of the annual salaries paid for such service. 4. The number of employees in the Customs Department for Three Rivers at the present date, and the annual amount of the salaries paid for such service. 5. The number of employees in the Inland Revenue Department for the district of Three Rivers on the 21st September, 1911, and the annual amount of salaries paid for such service. 6. The number of employees at the present date in the Inland Revenue Department for the district of Three Rivers, and the amount of the annual salaries paid for such service. 7. The number of employees, and the amount paid in salaries for the works on the St. Maurice, in the county of Champlain, during the year 1911-12. 8. The number of employees, and the amount of salaries paid per year for the works on the St. Maurice, in the county of Champlain, since 1911-12. 9. If the employees whose names follow, were dismissed on the 26th and 27th November, 1914, and the 4th and 5th January, 1915; Wildé Lavalée, Pierre Thicierge, Joseph Paquin, sr., Joseph Paquin, jr., Athanase Gélinas, clerks. 10. If so, at whose request, and for what reasons. 11. If those days were taken off the salaries of such employees. Presented 13th April, 1915.—*Mr. Bureau*.. .. .. .

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289. Report and evidence upon the matter known as: "Grazing Ranch No. 2422, J. G. Turriff, A. J. Adamson, and J. D. McGregor." Presented by Hon. Mr. Coderre, 13th April, 1915.. .. .. .

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EXPERIMENTAL FARMS

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DIVISION OF HORTICULTURE
DIVISION OF CEREALS
DIVISION OF BOTANY
DIVISION OF ENTOMOLOGY
DIVISION OF FORAGE PLANTS
DIVISION OF POULTRY
DIVISION OF TOBACCO

FOR THE YEAR ENDING MARCH 31, 1914.

PRINTED BY ORDER OF PARLIAMENT.

OTTAWA
PRINTED BY J. DE L. TACHE, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1915

[No. 16.—1915.]—32

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DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF HORTICULTURE

For the Year ending March 31, 1914

PREPARED BY

The Dominion Horticulturist, Central Farm, Ottawa. - - - - - W. T. Macoun.

Superintendent—

Experimental Station, Charlottetown, P.E.I. - - - - - - - - J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S. - - - - - - - - - - - - - W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S. - - - - - - - - - - - W. S. Blair.
Experimental Station, Fredericton, N.B. - - - - - - - - - - W. W. Hubbard.
Experimental Station, Ste. Anne de la Pocatière, Que. - - Jos. Bégin.
Experimental Station, Cap Rouge, Que. - - - - - - - - - - G. A. Langelier.
Experimental Farm, Brandon, Man. - - - - - - - - - - - - W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask. - - - - - - - - - - T. J. Harrison, B.S.A.
Experimental Station, Rosthern, Sask. - - - - - - - - - - W. A. Munro, B.A., B.S.A.
Experimental Station, Scott, Sask. - - - - - - - - - - - - R. E. Everest, B.S.A.
Experimental Station, Lethbridge, Alta. - - - - - - - - - - W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta. - - - - - - - - - - - G. H. Hutton, B.S.A.
Experimental Farm, Agassiz, B.C. - - - - - - - - - - - - - P. H. Moore, B.S.A.
Experimental Station, Invermere, B.C. - - - - - - - - - - - G. E. Parham.
Experimental Station, Sidney, B.C. - - - - - - - - - - - - - S. Spencer.

Experimentalists of Substations at Salmon Arm, B.C., Fort Vermilion, Grouard, Grande Prairie and Forts Resolution and Providence, in northern Alberta.

REPORT FROM THE DIVISION OF HORTICULTURE

Ottawa, March 31, 1914.

J. H. Grisdale, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the twenty-seventh annual report of the Division of Horticulture, being the sixteenth since I became head of the Division.

Included herein will be found the reports of the work at the Central Farm at Ottawa and those which have been prepared by the Superintendents of the Experimental Farms and Stations at Nappan, N.S., Kentville, N.S., Charlottetown, P.E.I., Fredericton, N.B., Ste. Anne de la Pocatière, Que., Cap Rouge, Que., Brandon, Man., Indian Head, Sask., Rosthern, Sask., Scott, Sask., Lethbridge, Alta., Lacombe, Alta., Agassiz, B.C., Invermere, B.C., and Sidney, B.C., also a report from Thos. A. Sharpe, Salmon Arm, B.C., of experiments conducted on his farm. There are also reports from the Sub-stations at Fort Vermilion, Peace River district; from Grouard, Lesser Slave lake; from Grande Prairie, Alta., and from Fort Resolution and Fort Providence, in the Mackenzie district.

Owing to the large proportion of my time spent in connection with the branch Farms and Stations, it is not possible for me now to look after as many of the details of the experimental work of the Horticultural Division at Ottawa as I once did, hence, as reported last year, I have divided the work into Pomology, Vegetable Gardening, Ornamental Gardening and Plant Breeding, and an assistant has been placed in charge of each of these. I have asked these assistants to prepare reports on the work which has been entrusted to them. These will be found further on in my report after the information on seedling apples originated in the Horticultural Division which, with that which goes before, has been prepared by me.

BRANCH FARMS.

With the large number of branch Farms and Stations now included in the Experimental Farm System, the work of the Horticultural Division in connection with them is considerable and has necessitated the devoting of a large part of the time of the Dominion Horticulturist to the planning of experiments on the new Stations, to the setting out of plantations of fruits, vegetables and ornamental plants, and to assisting the Superintendents of the older Farms and Stations by what advice it has been possible to give. During the past year also, as in previous years, many of the supplies of plants, seeds, labels, record books, and other material for the branch Farms and Stations has been either ordered through the Horticultural Division or sent from the Central Farm.

The Experimental Farm at Agassiz, B.C., was visited by me on March 31 and April 1, 1913. It was decided to remove eighteen of the sample hedges which have been tested there for a number of years, and most of which had not proved satisfactory. Notes were taken on these hedges before they were removed. Material for a home orchard and fruit plantation of varieties such as were considered desirable for farmers to grow on the lower mainland of British Columbia had been ordered by me and a

planting plan made, and this was set out during this spring. On September 13 I was again at Agassiz, and went over the horticultural work with the Superintendent and planned some changes in the ornamental grounds.

April 2 to 5 I spent at the Sidney Experimental Station and planned the planting of an avenue of Oriental Plane trees and the Western Flowering Dogwood, *Cornus Nuttallii*, from the East Saanich road to the beach. The seeding down with Kentucky Blue grass after the grading was completed was also arranged. I laid out a nursery, small fruit plantation, vegetable grounds, and a place for annuals on this visit. The Sidney Station was again visited on September 15 and 16. At this time an avenue of Tulip trees was suggested for the East Saanich road from the north to the south Station boundaries. These trees were subsequently ordered by me. While there it was planned to plant an 18-foot strip of shrubbery along the north boundary from the East Saanich road to the beach, and subsequent to my visit I prepared and sent a detailed planting plan for that part from the road to the British Columbia Electric line. At this time I also planned to run twelve rows of trees and shrubs along the north, west, and south boundaries above the East Saanich Road for testing the different species and varieties. The orchards and other fruit plantations were also discussed at this time, and subsequently detailed planting plans prepared by me were sent from Ottawa. Material for all of these plantations was ordered by me.

The Experimental Station at Invermere, B.C., was visited in September, and the experimental work gone over with the Superintendent. The position of the lawns and sample hedges was arranged and a road was staked out from the public road on the south side of the station to the Superintendent's house and barns. An avenue of trees was also planned along the public road on the south side of the Station from the brow of the hill north to the hospital. The trees for this were subsequently ordered by me.

The Experimental Station, Lethbridge, Alta., was visited on April 11 and 12, 1913, when I finished laying out the grounds west of the Superintendent's house. At this time the various plantations were gone over with the Superintendent, and experiments discussed. I was again at Lethbridge on September 6, when the desirability of extending the lawn in front of the Superintendent's house to the public road was discussed. It was also planned to have in this area a perennial border backed by shrubbery.

On April 14 and 15, I was at the Experimental Station, Lacombe, Alta., and planned some further planting on the ornamental grounds where planting was begun last year. This Station was provided this spring with material for a new bush fruit plantation, mainly from Ottawa, and the arrangement of these bushes was planned while I was at the Station. I was again at Lacombe on September 4 and 5, when plans were made for the planting of more windbreaks in the orchards which had suffered from exposure. It was also suggested that several acres be cleared in the woods at the southern part of the farm for an orchard where there was good natural protection.

I visited the Experimental Station, Scott, Sask., on April 16 and 17, and continued the planting of the ornamental grounds there. Material had been ordered by me to fill the vacancies in the orchards and small fruit plantations. Scott was again visited on September 2 and 3, when the horticultural work was gone over with the Superintendent.

Rosthern was visited on April 18 and 19, 1913. Some further planting was done in the ornamental grounds and the experimental work for the year discussed with the Superintendent. August 31 and September 1 were also spent at Rosthern in looking into the work there.

On April 21 and 22 I visited the Experimental Farm at Indian Head, Sask. At this time I went through the arboretum and marked for removal, after taking notes upon their condition, a considerable number of trees and shrubs that had not proved

hardy. A new road was also planned with the Superintendent as a continuation eastward of the avenue from the entrance. This runs across the arboretum and gives access to horse vehicles to the arboretum and hedges, where it was not possible to go before. At my suggestion, the Superintendent ordered sufficient apple trees from a Manitoba nursery for a small orchard east of the arboretum. The planting of an avenue from the town of Indian Head to the entrance gate of the Farm in order to improve the approach was also planned with the Superintendent, who arranged to prepare the soil during the summer. A wider opening in the forest belt at the entrance gate was also suggested as an improvement. On August 29 and 30, I was again at Indian Head. As the apple orchard east of the Farm buildings occupied ground which seemed the most suitable for poultry, and as there were few trees in this orchard which appeared of much value, it was decided to discontinue further planting here and to obtain a new site.

The Experimental Farm, Brandon, Man., was visited on April 22 and 23, when the plantations were seen with the Superintendent, and the work of the year discussed. The planting of a Caragana hedge between the row of sample hedges and the field to the south and far enough back to permit of a long perennial border along it was suggested. I was again at Brandon on August 28 and 29, when the experimental work was gone over with the Superintendent.

On May 8 I was at the Experimental Station, Cap Rouge, Que. A commercial orchard of McIntosh and Wealthy apples was planned, the trees for which were ordered by me this spring. Cultural experiments will be tried here. This Station was visited again in August when the horticultural work was discussed with the Superintendent.

I was at the Experimental Station, Ste. Anne de la Pocatière, Que., on May 8 to 10, and laid out, assisted in planting, pruned, and recorded an orchard of 3½ acres, consisting of 363 trees of apples, plums, and cherries. In August I was also at Ste. Anne and examined the trees planted in the spring and discussed future plantings with the Superintendent.

On June 17, I was at the Fredericton Experimental Station and, in addition to looking into the work already in progress, discussed with the Superintendent the future permanent plantations. The site of a long herbaceous border was decided upon on this visit and the soil was prepared during the summer. I was again at this Station on January 23, 1914, when visiting Fredericton to address the New Brunswick Fruit Growers' Association.

June 19 to 23 was spent at the Experimental Station at Kentville, N.S., and in visiting the demonstration orchards at Berwick and Bridgetown. During this visit the experimental work was gone over and discussed with the Superintendent. While attending the annual meeting of the Nova Scotia Fruit Growers' Association on January 20 and 21, I again had the opportunity of visiting the Station and meeting the Superintendent.

The Experimental Farm, Nappan, N.S., was reached on June 23. While here I marked a number of trees and shrubs, near the house and on the grounds, for removal as they were crowding others or encroaching on the roadway. The closing up of a long range of beds devoted to annuals was suggested, thus extending the lawn over to and into the orchard, putting the bed east of this extension.

I visited the Experimental Station, Charlottetown, P.E.I., on June 25, and went over the experimental work with the Superintendent. Changes on the ornamental grounds were suggested looking to the improvement of the same. These included the closing up of an iris, pæony, and rose bed, the making of two new beds parallel to the main driveway and also a perennial border along the trees bordering the public road, between the main driveway and the road to the barn.

OTTAWA.

MEETINGS, ADDRESSES, AND PLACES VISITED.

Every year meetings are attended and addresses given by the staff of the Horticultural Division, and places are visited where information can be obtained which will be useful in the work.

In November, 1913, I visited the Massachusetts Agricultural Station, Amherst, Mass.; the New England Apple Show, Boston; and the Arnold Arboretum, Jamaica Plain, Mass.; at all of which places valuable information was gained. During the same month I attended the annual meeting of the Society for Horticultural Science, Washington, and delivered an address on "The Characteristics of One Hundred Northern Spy Apple Seedlings." The biennial meeting of the American Pomological Society was also held here and at this meeting I gave an address on "The Present Status of Canadian Pomology." I also responded on behalf of the "North" to the address of welcome. As one of the jury of three on "The Student Fruit Judging Contest," held in connection with the meeting of this society I was able to render further service. At the exhibition of fruit held by this society at the time of the meeting I showed a collection of nearly one hundred and fifty varieties of apples all of Canadian origin. Most of these were new varieties originated at the Central Farm at Ottawa. For this collection the Canadian Government was awarded a silver Wilder medal. On December 2 and 3, 1913, I attended the winter meeting of the Quebec Pomological Society at Westmount, Que., and gave an address on "Experiments in Fruit Culture at the Central and Branch Farms." At the annual meeting of the Nova Scotia Fruit Growers' Association, held at Kentville, I spoke on "Strawberry Culture" on January 21, 1914, and at the annual meeting of the New Brunswick Fruit Growers' Association on January 23, delivered addresses on "Some New Varieties of Apples" and "Experiments in Orchard Culture at the Central Farm." At the short course in horticulture at Macdonald College, I gave two addresses on February 11, one on "Work in Horticulture on the Experimental Farms" and an illustrated lecture on "The Beautifying of Home Grounds." On February 20 I gave an address on "Bulbs, Planting and Forcing" before the Ottawa Horticultural Society. I gave addresses at the meetings of the Niagara Peninsula Fruit Growers' Association on February 25, 26, 27, 1914, at Grimsby and St. Catharines, Ont., on "Fruit Growing, Varieties and Methods Throughout Canada : "Best Varieties of Plums, Pears and Apples for Commercial Orchards"; "Best Varieties of Strawberries and Raspberries for Commercial Plantations"; and "Influence of Temperature on Fruit Growing." The twenty-fifth anniversary of the Burlington Fruit Growers' Association was attended at Burlington on March 11, 1914, when addresses were delivered on "Horticultural Methods in Different Parts of Canada with their application to Burlington," and on "Varieties of Fruits for the Burlington District."

My assistants in the Horticultural Division also rendered considerable service during the year. Mr. F. E. Buck judged the flowers and fruits at the exhibition at Perth, Ont., and Knowlton, Que., in September, 1913. He also judged at Carp on October 1. He attended the annual meeting of the Ontario Horticultural Association at Toronto on November 20 and 21, 1913, and gave addresses on "Recent Experimental Work" and notes on "New and Little Known Annuals tested at Ottawa."

In September, 1913, Mr. C. F. W. Dreher attended the meeting of the American Vegetable Growers' Association at Toledo, Ohio. Earlier in the season he paid a visit to the Horticultural Experiment Station, Vineland, Ont., the Ontario Agricultural College, Guelph, Ont., and the Cornell Agricultural College, Ithaca, N.Y., to study methods employed there and results. On the same trip he visited the Bow Park Farm, Brantford, Ont., and vegetable growers in the vicinity of Toronto and London, Ont., for the same purpose. He also attended the meeting of the Ontario Vegetable Growers' Association held in Toronto, November, 1913.

OTTAWA.

Mr. A. J. Logsdail visited the Grimsby district to collect pollen for breeding work in May, 1913, and to do some crossing there. He also attended the meeting of the Ontario Fruit Growers' Association in Toronto in November.

Mr. M. B. Davis delivered an address at the meeting of the Quebec Pomological Society on December 2 on "Co-operation in Nova Scotia." He attended the annual meeting of the New York State Horticultural Society at Rochester, N.Y., in January, 1914, and at that time made a special study of spraying machinery. On February 20 he gave an address on "The Outlook for Fruit Growing" at a meeting of the St. Lawrence Valley Fruit Growers' Association at Morrisburg, Ont. He spent several days in the Niagara peninsula in March, 1914, making a special study of the "dehorning" of apple trees.

NEW GREENHOUSES ERECTED FOR THE HORTICULTURAL DIVISION, CENTRAL EXPERIMENTAL FARM.

Four new greenhouses erected for the Horticultural Division at the Central Experimental Farm are nearing completion and are already occupied. They are what is known as the Pierson U-Bar flat-iron curved-eave construction and will give about 7,500 square feet under glass. They are heated with hot water from sectional boilers, and consist of a main house 107 feet 6 inches long and 25 feet wide, divided into two by a glass partition, and three detached houses 12 feet apart on one side of it, each 58 feet 6 inches long and 25 feet wide, and each connected with the main house by a glass portico. The main purposes to which these houses will be put are as follows:—

Five different kinds of benches are being installed which will be tested for relative usefulness and durability. On these and in the solid beds on the ground different methods of culture of flowers, vegetables, and of some fruits will be tried.

The cross-breeding of flowers, fruits, and vegetables will be carried on during the winter months, and selections made from existing varieties or strains.

A specialty will be made of the testing of florists' novelties and reporting on the same.

Although tomatoes, radish and lettuce are the winter vegetable crops usually grown, it has been found that other kinds of vegetables succeed well when forced, and experiments will be tried with a variety of crops.

Experiments will be tried in the forcing of strawberries, grapes and other fruits. This winter several hundred pots of strawberries are being forced with the object of learning which succeeds best. Fifty pots of fifteen varieties of European grapes are being forced, it being believed that there will be a growing demand for these grapes in Canada. Being in pots the vines do not take up space permanently in the houses, but can be moved about when necessary. In England grapes are successfully forced in this way.

A large number of plants are needed for bedding on the ornamental grounds at the Central Farm, and the greenhouses will be utilized for propagating these.

Hitherto the glass available has been so limited that it was not possible to do much experimental work under glass, but with the five houses now available it will be possible to do much more and better work.

OTHER IMPROVEMENTS DURING THE YEAR.

Nearly every year the ornamental grounds suffered badly from lack of water, as no adequate supply could be obtained under the conditions which prevailed previous to this year, but in 1913 the large lawn was piped and taps put at suitable places to serve the grass, flower beds and borders. The rose garden was also piped and in future an abundant supply of water is assured.

OTTAWA.

PUBLICATIONS.

During the year I prepared a new edition of the bulletin on Plum Culture, which was published, in which there was much new material and the old altered where necessary to bring it up to date. For the International Institute of Agriculture at Rome, I contributed a paper on "The Present Status of the Fruit Industry of Canada" which was published in the December, 1913, issue of their *Monthly Bulletin of Agricultural Intelligence and Plant Diseases*. Contributions were also made to the *Agricultural Gazette of Canada*. Many papers were prepared, as indicated under the paragraph on meetings and addresses for different horticultural societies throughout Canada and the United States which are published in their annual reports.

CORRESPONDENCE.

Notwithstanding the many provincial institutions throughout Canada to which a large number of persons must write for information on horticultural subjects, the correspondence in the Horticultural Division continues to be very considerable. In 1913 there were 6,426 letters received and 6,747 despatched. A large proportion of these letters required technical information which must have proved of great value to those asking for it. It is believed that it is the people who ask for information that profit most by what is given to them, and the numerous letters which have been received expressing appreciation for the letters, reports or bulletins sent to them is very gratifying and inspires one to make greater efforts to render help in this manner. The other office work of the Horticultural Division continues to grow.

DONATIONS.

Each year the Horticultural Division receives donations of seeds, cuttings, and plants. Those received in 1913 are gratefully acknowledged herewith:—

FRUITS.

Sender	*Donation.*
Dearness, J., London, Ont.	Apple Scions.
Fisk, J. M. Abbotsford, P.Q.	Grape cuttings.
Guay, A. E., Ville Marie, Que.	Scions Temiscamingue plum.
Johnston, R. A. A., Ottawa, Ont.	Grape cuttings from Grand Canyon, Arizona.
Rockhill, Harlow, Conrad, Iowa.	Strawberry plants.

VEGETABLES.

Armstrong, C. G., Orono, Ont.	Seed of Ne Plus Ultra Swede turnips.
Bieroft, G. W., London, Ont.	Onion sets, Egyptian forcing.
Bond, John S., Shellmouth, Man.	Century lettuce seed.
Bonskill, F. G. Port Hope, Ont.	Seed of Earliana tomato, and of a chan tomato.
Burpee, Atlee Co., Philadelphia, Pa.	Seed of new beet from Holland.
Herripin, J. L'Annonciation, Que.	Potatoes.
Hoydon, A., Bigstone, Alta.	"The Pride" seedling potato.
Leach, D. H., Salmon Arm, B.C.	Potatoes.
McIntosh, Mrs. M., Elmside, Que.	Canadian Beauty potatoes.
O. A. C., Guelph, Ont.	Seed of Hipper No. 2 and Industry tomato.
Speers, J. B., Aurora, Ont. (per Mr. Kime)	Early Eclipse potato.
Stevenson, A. P., Dunstan, Man.	Seed of Free Press corn and Selected tomato
Whitby, Geo., Harmattan, Alta.	Duke of York potatoes.

OTTAWA.

ORNAMENTAL PLANTS.

Arnold, Arboretum, Jamaica Plain, Mass.. .. .. Trees and Shrubs.
Fisher, E., Kamloops, B.C... .. .. Hollyhock seed.
Macoun, Prof. John, Sidney, B.C... .. .. Cuttings of *Populus Vancouveriensis*.
Stephens, C. L., Orillia, Ont... .. .. Columbine seed.
Home Nursery Co., Lafayette, Ill.. .. .. 2 plants Polish privet.

PLANT BREEDING.

Duncan, C. O., Vineland, Ont.. .. .. Strawberry plants and seed of apple crosses.
Dewar, R., Grimsby, Ont.. .. .. Seed of commercial varieties of grapes.
Gellatley, D., Gellatley, B.C... .. .. Tomato seed.
St. Ryan, W., Grimsby, Ont.. .. .. Seed of apple crosses.
Sweet, J. (V.M.H), Oakleigh Park, London, England.. .. .. Seed of New grapes. (*V. vinifera.*)
Tielebein, F., Millet, Alta.. .. .. Tomato seed.
Turney, A. G., Fredericton, N.B... .. .. Strawberry plants.

STAFF OF THE HORTICULTURAL DIVISION.

W. T. Macoun, Dominion Horticulturist.
M. B. Davis, B.S.A., Assistant in Pomology.
F. E. Buek, B.S.A., Assistant in Ornamental Gardening.
A. J. Logsdail, B.S.A., Assistant in Plant Breeding.
C. F. W. Dreher, B.S.A., Assistant in Vegetable Gardening.
J. F. Watson, Secretary.
H. Holz, Foreman of the Division.
Wm. T. Ellis, Foreman in charge of Greenhouse.
J. McKee, Foreman in charge of new Greenhouses.
H. J. Read, Foreman in charge of Records.
J. Taggart, Foreman of Ornamental Grounds.
M. D. MacCallum, Stenographer.
G. E. Bass, Stenographer.

ACKNOWLEDGMENTS.

I desire to acknowledge the help rendered to the Horticultural Division and to me personally during the past year by the members of the staff of the Division at the Central Farm and by the Superintendents of the branch Farms and Stations. Mr. F. E. Buek, B.S.A., Assistant in Ornamental Gardening, has continued to care for and develop the lawns and flower gardens with the experiments connected therewith, and has shown much enthusiasm in his work. Mr. A. J. Logsdail, B.S.A., Assistant in Plant Breeding, who began new lines of work in plant breeding and continued the work already begun, has shown great interest in his specialty. Mr. C. F. W. Dreher, B.S.A., Assistant in Vegetable Gardening, has been devoted to his work. Mr. M. B. Davis, B.S.A., Assistant in Pomology, though appointed near the close of the fiscal year, has already given me substantial help. The Secretary of the Division, Mr. J. F. Watson, after being connected with the Division for twenty-one years, is leaving it at the end of the fiscal year to devote his time to Exhibition work. He has been associated with me for the past sixteen years and I desire to express my appreciation of the work rendered by him to the Horticultural Division and especially in regard to what he accomplished in helping to systematize the office methods. I much regret his leaving the Division, but wish him much success in his new field of work. Mr. M. D. MacCallum will take up the duties of secretary as, during the past year, by his diligence and accuracy he has shown himself to be competent in the work. Mr. G. E. Bass, who has

been assisting in the correspondence and other office work, has also rendered efficient service. Mr. H. Holz, foreman, continues to oversee the outside work of the Division in a satisfactory manner. Mr. James McKee, foreman in charge of the new greenhouses, although connected with the Horticultural Division for only a few months, has been very successful with the plants under his charge, and the appearance of the houses is a credit to him. Mr. W. T. Ellis, who remains in charge of the old greenhouses until the end of the fiscal year and afterwards will devote his time to the records of the Horticultural Division, has been in charge of the old greenhouses since 1887, during which time he has rendered faithful service. Mr. Horace Read continues to keep satisfactorily many of the horticultural records of the Central and branch Farms and Stations. Mr. James Taggart, the foreman of the ornamental grounds, has again looked after this part of the work to the best of his ability. To the other men who, though in less responsible positions, yet give their physical strength to the work, I wish to extend my appreciation of their services.

During the year it has been my duty to have much to do with the Superintendents of the branch Farms and Stations, both while visiting their places and through correspondence, and I am very pleased to express my appreciation of the spirit of co-operation shown by them all.

I have the honour to be, sir,
Your obedient servant,

W. T. MACOUN,
Dominion Horticulturist.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

CHARACTER OF SEASON.

The frost was out of the ground sufficiently to plough and dig in certain places in the Horticultural Division on April 15, 1913, the average for fifteen years being April 12. There was some very hot weather in April, the highest temperature being 86·5 F. It was over 70° on six days during the month. The lowest temperature was 21° on the 20th.

The first week of May was very warm, and fruit trees began to bloom earlier than usual, crab apples beginning to bloom on the 4th, when the highest temperature for the month 89° F. was recorded. After May 6 the weather became cool and continued so throughout the month. The strawberries, which were uncovered on the 5th were found badly injured, evidently by the ice during the winter. There were frosts recorded on four days during the month, the lowest temperature being on the 10th when it was 28·8°F.; the last frost recorded was on May 15 when the temperature was 30° F. Flowers of currants were injured by frost, and the early blooming varieties of plums suffered badly, practically no fruit setting.

June was cool up to the 10th. On June 9 there was a light frost on the lower ground, though none recorded by the standard thermometer, necessitating the covering of tomato plants the night before. The remainder of June was very warm, and as there was little rain vegetation suffered considerably. The highest temperature for the month was 93·2 F. on the 27th. It was 80° and over on twelve days during the month.

July was a very warm month, with little rain. The highest temperature was 100°F. on the 4th, being the highest ever recorded at the Central Experimental Farm. The temperature was 90° and over on six days, and 80° and over on nineteen days during the month. Early in the month the lawn grass was burned brown in many places, the strawberries dried up, the potatoes were badly checked in their growth,

and many other things suffered. Nearly an inch of rain falling on the 12th did much good, but by the 19th the lawn grass had not yet become green and more rain was needed. This want of sufficient rain continued until August 22, by which time the grass looked worse than was ever remembered.

August was a warm month, a very warm spell lasting from the 1st to the 21st. The highest temperature during the month was 97·2° on the 17th.

September was a fine warm month. The temperature was below freezing on one day only, the 15th, when it was 30°, and tender things were killed, although tomatoes in protected places pulled through. The highest temperature was 88° on the 2nd.

The early part of October was fine and moderately warm. There was no frost since the middle of September until October 22, when the temperature fell to 26·2, the tomatoes not being killed until this time. The ground was not thoroughly wet until the last week of this month. It has been a very dry growing season.

November was a mild month, the temperature being above freezing on every day but two. The highest temperature was 63·2° on the 22nd, and the lowest 17·2° on the 28th. There was snow on the 28th, but this disappeared as the weather became mild and winter did not set in until December 7, on which day there was a heavy snowfall on unfrozen ground. The average date that winter set in during the past sixteen years is November 25.

December was mild for a winter month, the lowest temperature being 5° below zero on the 27th and 28th, being the only times it was below zero during the month. It was above freezing on seventeen days. By the end of the month there was about a foot of snow on the ground.

The weather continued comparatively mild until January 10, after which it was much colder. The lowest temperature during the month was 30·0° below zero. It was below zero on fourteen days during this month. There was a good covering of snow during the month and about 18 inches on the level at its close.

February was the coldest month of the winter. It was below zero on nineteen days during the month and on the 11th it reached 30·2° below zero. On five days the temperature was above freezing.

March was a moderately cold month, although on eighteen days the temperature rose above freezing. It was three times below zero during the month, the lowest being 2° below on the 20th, and the highest 48° above on the 26th. There was very little precipitation during the month. The snow went very gradually, and at the end of the month the ground was appearing only in places.

FRUIT AND VEGETABLE CROPS, 1913.

While the apple crop in some parts of Canada was a medium to good one in 1913, the fruit in many places was of an inferior grade owing to the development of the Apple Scab Fungus. This was particularly true of the Maritime Provinces, the province of Quebec, and eastern Ontario. Spring frosts also reduced the crop in many places in Eastern Canada, Nova Scotia suffering most in this respect, the crop there being much reduced and in some places practically the whole crop was destroyed. In eastern Ontario and the province of Quebec the Tent Caterpillars caused great destruction. In British Columbia the crop was medium to light. On the whole it was a very unsatisfactory apple crop. Pears were a good crop in Ontario, but light elsewhere. The plum crop was good in most places in Canada. It was light in Nova Scotia, however. There was a good crop of peaches both in Ontario and British Columbia. The crop of grapes was good in the province of Ontario, where they are mainly grown. The strawberry crop was a light one in most places in 1913. Spring frosts and drought caused most of the loss. The crop of other small fruits was fair.

OTTAWA.

Potatoes and tomatoes were a good crop on the whole, but in some parts, particularly in eastern Ontario and the province of Quebec, the potato crop was much reduced by the drought which set in when the tubers were forming and caused the tops to dry up.

At the Central Experimental Farm the apple crop, notwithstanding the spring frosts, was a medium one. On account of there being so many varieties under test in the orchards at the Central Farm, there is usually a good crop on trees of a number of them, and at least a medium crop on the whole. The better varieties of pears have not proved a success at Ottawa, being killed sometimes by winter and sometimes by blight, but there are a few Russian or European varieties, although of inferior quality, which are both hardy and blight-resistant, and bore fair crops in 1913. These were Kurskaya, Lemon and Sugar.

The crop of native plums was practically destroyed by spring frosts, but the Americana varieties, which are later in blooming, were not so badly affected, and there was a medium to light crop of them. The cherry and European plum crop was practically a failure owing to injury to the flower buds, probably in late winter or early spring, when there are sudden and great changes of temperature. Grapes were a light crop this year, due evidently to spring frosts; currants and gooseberries were below medium, for the same reason. The crop of strawberries was poor owing to ice remaining on the plantations for a long time and killing a large proportion of the plants. Spring frosts also injured the flowers on plants which were left. The raspberry crop was light but this was mainly due to drought, though the canes lacked vigour.

The potato crop promised well until the latter part of July, when the extremely hot, dry weather caused the leaves to dry up and the crop was below medium. The tomato crop was also reduced considerably by the drought, and in fact most vegetables suffered.

SEEDLING FRUITS SENT TO THE HORTICULTURAL DIVISION FOR EXAMINATION, 1913-14.

For the past twenty-six years, seedling fruits have been sent to the Central Experimental Farm for examination and test. The fruit is usually sent first, and if the variety is considered promising, scions or cuttings are asked for and, as a result, many promising fruits of Canadian origin are now under test. During 1913-14 the following persons sent samples. Descriptions were made of all of these fruits, but only those considered promising for some part of Canada are described in this report.

Record Number.

596 Seedling apple from C. H. Black, Spencerville, Ont.
597 " " from H. J. Clarke, Belleville, Ont.
598 " " from R. M. Bethanbreck, Watertown, Ont.
599 " " No. 1 from C. L. Stephens, Orillia, Ont.
600 " " No. 2 from C. L. Stephens, Orillia, Ont. (See description.)
601 " crab apple from F. E. Webster, Creemore, Ont.
602 " apple (British Columbia new seedling Spy X Sow apple) from F. S. Fairfield, Orono, Ont.
603 " apple No. 3 from Geo. Bowman, Tin Cap, Ont.
604 " " from F. E. Webster, Creemore, Ont.
605 " " from E. P. Bradt, Morrisburg, Ont. (See description.)
606 " crab apple from Mrs. Dennis Darcy, Sheenboro, Pontiac, Que.
607 " apple "Loomer" from E. L. Loomer, Kingsport, N.S. (See description.)
608 " " from Ernest H. Eaton, Upper Canard, N.S.
609 " " from W. E. Easton, Cobble Hill, B.C.
610 " " " " "
611 " " " " " (See description.)
612 " peach from W. O. Burgess, Queenston, Ont.
613 614 " grapes from C. L. Stephens, Orillia, Ont.

OTTAWA.

600. *Seedling apple No. 2 from C. L. Stephens, Orillia, Ont.*—Above medium size; oblate; cavity open, medium depth; stem short, stout; basin medium depth and width, smooth; calyx open; yellow, streaked, splashed and washed with orange red; seeds medium size, acute; dots obscure, except some distinct brownish marks; skin moderately thick, moderately tough; flesh yellowish, tender, melting; core small, flavour subacid, juicy, pleasant, aromatic; quality good; season late September, evidently to November.

A pleasant dessert apple with a little the flavour of Sops of Wine. May be useful, coming after Duchess.

605. *Seedling apple from E. P. Bradt, Morrisburg, Ont.*—Medium size; oblate to roundish, ribbed; cavity open, deep; stem medium length, slender; basin deep, open, wrinkled; calyx closed; yellow well washed with crimson; seeds medium size, broad, acute; dots indistinct; skin moderately thick, moderately tender; flesh yellowish, tender, juicy; core small, open; flavour subacid, pleasant; quality good; season evidently November to February; tree grown in a lot in Morrisburg and said to be a seedling.

From outward appearance and flesh would consider it a seedling of McIntosh. Evidently the same season as McIntosh and, if hardier, will be promising.

607. *Seedling apple from E. L. Loomer, Kingsport, N.S.*—Below medium size; roundish to oblate; cavity medium depth and width, russeted at base; stem medium length, slender; basin medium depth and width, wrinkled; calyx open; yellow, well washed with very dark red; seeds below medium, acute; dots few, greyish, distinct; skin thick, tough; flesh white but almost all tinged with red, tender, juicy; core medium size, open; flavour mildly subacid, pleasant, raspberry-like; quality good; season evidently September and October.

Of the Fameuse group. This was top-grafted on Gravenstein about thirty-five years ago. Have suggested the name of "Loomer." Rather too dark in colour and stained flesh might be against it.

611. *Seedling apple from W. E. Easton, Cobble Hill, B.C.*—Medium size; roundish; cavity medium depth and width; stem medium length, stout; basin medium depth and width, wrinkled; calyx closed or partly open; yellow; seeds below medium, acute; dots moderately numerous, grey, conspicuous; skin thin, tender; flesh, white, crisp, juicy, tender; core small; flavour subacid, pleasant; quality good; season evidently September to early October.

A good dessert apple, which might be desirable to propagate if productive and hardy.

APPLES ORIGINATED IN THE HORTICULTURAL DIVISION, CENTRAL EXPERIMENTAL FARM.

Each year a few of the best of the many seedling apples originated in the Horticultural Division are named, and descriptions published in the annual report. Since 1903 there have been 1,214 different varieties fruited which have been raised from seed without hand pollination and of which only the mother parent is definitely known. Of these, sixty-six fruited for the first time in 1913. Of the total of 1,214 which have fruited ninety varieties have been considered sufficiently promising for some part of Canada to name, and the descriptions of ten are now published for the first time.

Ambo (Swayzie Seedling).—Size above medium; roundish, ribbed; cavity deep, open, russeted; stem short, stout; basin deep, open, wrinkled; calyx open; pale yellow

thinly splashed and washed with carmine; seeds medium size, acute or obtuse; dots few, white, indistinct; skin moderately thick, tender; flesh dull white, tender, melting, moderately juicy, core small open; flavour subacid, spicey, pear-like; quality good to very good; season September to October.

Resembles Swayzio somewhat in flavour, but not specially otherwise. Promising.

Casco (McIntosh Seedling).—Size medium to below; roundish; cavity medium depth and width, russeted; stem short, stout; basin open, medium depth, wrinkled; calyx closed; yellow well washed and splashed with bright attractive crimson; seeds medium size, acuminate; dots few, small, indistinct, white; bloom pinkish; skin moderately thick, tender; flesh, yellowish, crisp, tender, juicy, perfumed; core medium size, open; flavour, subacid, pleasant; quality good; season September and October.

Resembles McIntosh very much in outward appearance, flesh, flavour, and perfume, but smaller.

Consort (Wealthy Seedling).—Above medium size, oblate; cavity deep, open; stem short, stout; basin deep, open, nearly smooth; calyx open; greenish yellow splashed and washed with crimson; seeds above medium, obtuse; dots obscure; bloom pinkish; skin moderately thick, moderately tender; flesh yellow, crisp, tender; core small to medium; flavour subacid, pleasant, juicy; quality good; season late November probably to March.

Does not resemble Wealthy except in character of flesh.

Dulcet (Langford Beauty Seedling).—Medium size; roundish, regular; cavity medium depth and width, slightly russeted; stem medium length, slender; basin medium depth and width, smooth; calyx open or partly open; pale greenish yellow well washed with deep crimson; dots moderately numerous, yellow distinct; bloom thin, bluish; skin moderately thick, moderately tender; flesh yellowish, very tender, juicy; core medium; flavour sweet or mildly subacid, pleasant; quality good; season mid-September to mid-November.

A good sweet apple.

Gilda (McIntosh Seedling).—Medium to below medium in size; oblate regular; cavity medium depth and width; stem medium length to short, stout; basin deep, open, smooth; calyx open; yellow well washed and splashed with bright crimson; seeds medium size, broad, acute, plump; dots numerous, white distinct; bloom thin, pinkish; skin moderately thick, moderately tough; flesh yellowish, a little coarse, juicy; core medium; flavour subacid, pleasant; quality good; season October to probably January.

Resembles McIntosh a little in flesh and flavour. Attractive.

Jethro (Wealthy Seedling).—Above medium size; oblate to roundish, conic; cavity medium depth and width; stem short, stout; basin deep, medium width, wrinkled; calyx open; pale yellow washed and splashed with orange, red and carmine, green about cavity; seeds medium size, acute; dots numerous, yellow, distinct; skin moderately thick, moderately tough; flesh yellowish, crisp, tender; core medium size, open; flavour juicy, briskly subacid, pleasant; quality good; season late September to December.

Resembles Wealthy very much in flesh and flavour.

Lucia (Salome Seedling).—Medium to above medium size; roundish, slightly flattened at ends, slightly ribbed; cavity medium depth, open; stem short, stout; basin open, medium depth, nearly smooth; calyx open; yellow thinly splashed and washed with orange; seeds medium size, acuminate; dots obscure; skin moderately thick, moderately tough; flesh yellow, crisp, firm, juicy; core medium; flavour subacid, pleasant; quality good; season mid-December to March or April.

No marked resemblance to Salome.

Ottawa.

Sparta (Northern Spy Seedling).—Medium size; roundish; cavity open, deep; russeted; stem short, moderately stout; basin deep, open, nearly smooth; calyx open; greenish yellow washed and splashed with crimson; seeds medium size, acute; dots very few, white, indistinct; skin moderately thick, tender; flesh yellowish, crisp, juicy; core medium, open; flavour briskly subacid, pleasant; quality good; season December to late winter.

Resembles Northern Spy somewhat in flesh and flavour.

Toshlet (McIntosh Seedling).—Below medium size; roundish, regular; cavity medium depth and width, sometimes lipped; stem medium length, slender; basin shallow to medium, open, nearly smooth; calyx open, or partly open; yellow well washed with attractive crimson; seeds medium size, acute; dots few, yellow distinct; skin thick, tender; flesh white and yellowish with traces of red, crisp, juicy; core medium; flavour subacid, pleasant; quality good; season November to January.

Resembles McIntosh very much in outward appearance and flavour, but smaller. A handsome apple.

Valerie (McIntosh Seedling).—Medium to below medium size conical; cavity medium depth, russeted; stem short, stout; basin shallow, medium width, wrinkled; calyx closed; pale yellow well washed with bright crimson; dots few, pale, distinct; bloom none; skin moderately thick, tough; flesh white, tender, juicy, crisp; core medium; flavour subacid, pleasant; quality good; season late August to mid-October.

Attractive in appearance. Resembles McIntosh in character of flesh and flavour.

CHARACTERISTICS OF ONE HUNDRED SEEDLINGS OF NORTHERN SPY APPLE ORIGINATED IN THE HORTICULTURAL DIVISION.

At the Central Experimental Farm, seed of a number of varieties of apples, including Northern Spy, was saved from the 1898 crop of fruit, the object being to obtain, if possible, new varieties which it was hoped would prove superior to those already available, and which could be successfully grown in parts of Canada where the winter was as severe or more severe than it is at Ottawa. It was thought that in an orchard containing a large number of varieties of apples the chances of obtaining desirable combinations of characters were very good. These seedlings where one parent only is known would also be interesting to compare with those grown from seed produced by hand pollination where both parents were known, should such crossing be done, as it was subsequently.

The Northern Spy apple had not fruited at Ottawa as a standard tree, it not being sufficiently hardy to withstand the winters there, but in 1898 we were successful in obtaining fruit from this variety top-grafted on Oldenburgh, but subsequently the graft was killed by a very severe winter. No special selection was made of the fruit from which the seeds were taken. The seeds were sown in the spring of 1899 but, with few exceptions, did not germinate until the spring of 1900 and after being transplanted and grown in nursery rows were planted in the orchard in the spring of 1901 and 1902, a few only being planted in 1901. The trees with but few exceptions are strong growers, and only a small proportion has been injured by winter. The detailed descriptions of the one hundred seedlings referred to in this report were practically all taken by the writer. In such work as describing varieties of apples it is desirable that the descriptions be taken by one person, especially where comparisons are to be made, as in most of the characteristics described it is a matter of individual judgment rather than exactness. We believe that it is important to bring together the notes thus made as, in our judgment, they furnish strong evidence of the value of the Northern Spy apple in breeding new varieties. It may be stated here that descriptions of the characteristics of seedlings of other varieties were given in the

annual reports of the Central Experimental Farm for 1909 and 1911. A much larger proportion of the seedlings of some mother parents resemble the parent in certain ways than of others.

CHARACTERISTICS OF ONE HUNDRED NORTHERN SPY SEEDLINGS ORIGINATED AND FRUITED AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, CANADA.

Size.[1]	*Per cent.*
Small	2
Below medium	12
Medium	48
Above medium	25
Large	13
	100

The size of Northern Spy is above medium to large.

Form.	*Per cent.*
Oblate	28
Roundish conical or roundish	69
Conical	3
Oblong	0
	100

The form of Northern Spy is roundish conical.

Colour.	*Per cent.*
Green or yellow predominating	7
Red or crimson	67
Pinkish red	4
Orange and Orange red	22
	100

The colour of Northern Spy is red, varying in shade from pinkish red to bright red.

Cavity.	*Per cent.*
Small	9
Medium	51
Large	40
	100

The cavity of Northern Spy is large.

Stem.[2]	*Per cent.*
Short	54
Medium	41
Long	2
	97

The stem of Northern Spy is short to medium.

Basin.	*Per cent.*
Small	16
Medium	58
Large	26
	100

The basin of Northern Spy is medium.

Calyx.[2]	*Per cent.*
Open	78
Closed	21
	99

The calyx of Northern Spy is usually closed but often open.

[1] NOTE.—Apples under 1½ inches in diameter are very small; between 1½ and 2¼ inches, small; 2¼ to 2½ inches, below medium; 2½ to 2¾ inches, medium; 2¾ to 3 inches, above medium; 3 to 3½ inches, large; above 3½ inches, very large.

OTTAWA.

Seeds.[2]	*Per cent.*
Small	0
Medium	90
Large	4
	94

The seeds of Northern Spy are medium in size.

Dots.	*Per cent.*
Distinct	50
Indistinct	50
	100

The dots of Northern Spy are distinct though not conspicuous.

Skin.	*Per cent.*
Thin	3
Medium	87
Thick	10
	100

The skin of Northern Spy is medium in thickness.

Skin.[2]	*Per cent.*
Tender	33
Medium	32
Tough	33
	98

The skin of Northern Spy is moderately tender to tender.

Flesh.[2]	*Per cent.*
Juicy	45
Moderately juicy	51
	96

The flesh is noted as tender in 72 per cent, crisp in 47 per cent, and coarse in 17 per cent of the seedlings. The flesh of Northern Spy is crisp, tender and juicy.

Core.	*Per cent.*
Small	18
Medium	76
Large	6
	100

The core of the Northern Spy is medium.

Core.	*Per cent.*
Axile	64
Abaxile	36
	100

The core of Northern Spy is Abaxile.

Flavour.	*Per cent.*
Sweet	7
Mildly subacid	4
Subacid	61
Briskly subacid	27
Acid	1
	100

The flavour of Northern Spy is subacid.

Quality.	*Per cent.*
Medium	25
Above medium	46
Good to very good	29
	100

The quality of Northern Spy is very good.

[2]This character was not recorded for quite all the seedlings.

Season.	*Per cent.*
August to mid-September	1
Mid-September to mid-October	16
October and November	43
December to February	22
December to April	18
	100

The season of Northern Spy is December to April.

Resemblance.—Notes were taken when there was a marked resemblance to Northern Spy in other characteristics, and the following gives some indication of the proportion of these points of resemblance.

	Per cent.
In general appearance	35
In form	12
In flesh	39
In colour	19
In flavour	35
No marked resemblance	12

Size.—Only 2 per cent of the seedlings was small. Of these, one variety had the firm breaking flesh of a crab apple, the other was like a small apple. Only 12 per cent was below medium, leaving 86 per cent of good marketable size. Over 1,200 seedlings of eleven different parents have now fruited and the per cent of apples of marketable size is about 80 per cent.

Form.—Sixty-nine per cent of the apples was roundish or roundish conical, but it is interesting to note that 28 per cent was oblate, which is a fairly large proportion.

Colour.—Only 7 per cent had green or yellow colour predominating, but the per cent of orange and orange red colour, 22, is striking. There are indications that the Northern Spy when in bloom received pollen from Sops of Wine, an orange red coloured variety growing in the orchard, as the flavour of some of the seedlings resembles Sops of Wine.

Flavour.—Eighty-eight per cent of the seedlings was subacid or briskly subacid, and 7 per cent was sweet. Four per cent mildly subacid and 1 per cent acid. This does not, however, represent the true flavour. Thirty-six per cent had a flavour distinctly Northern Spy-like and it would be very difficult to distinguish some of the apples from Northern Spy in this respect. There are, among these, seedlings with the flavour of Northern Spy with a season beginning in September and ending in spring. Eight per cent had a peculiar flavour somewhat resembling Arkansas Black, or Pawpaw, and as this flavour has been detected in a seedling of Northern Spy sent from another part of Canada it would indicate that in the ancestry of the Northern Spy there was a variety with that flavour. A few, 2 per cent, had a flavour resembling Sops of Wine; this flavour was also detected in Wealthy seedlings.

Quality.—It was hoped that an apple as good in quality as the Northern Spy would give a fair proportion of seedlings of good flavour and quality, and we have not been disappointed. Seventy-five per cent are distinctly above medium in quality, of which 29 per cent are good to very good.

Season.—It is quite encouraging to find that 40 per cent of the seedlings are winter apples, only one seedling out of the 100 being a summer variety, and only 16 per cent early autumn, whereas in the case of the Wealthy seedlings, 21 per cent were summer apples, and 29 per cent early autumn, and 21 per cent winter.

Number propagated and named.—Of the 100 seedlings described, no less than forty-five were considered sufficiently promising to propagate for further test, and

seventeen of the best have been named as follows: Ascot, Bingo, Donald, Elmer, Epsom, Glenton, Homer, Nestor, Marcus, Niobe, Orlando, Rocket, Rosalie, Sandow, Sparta, Tasty and Thurso. Of these, ten are autumn varieties and seven winter. As rapidly as possible these are being propagated and sent to the Experimental Stations and private individuals in Canada and the United States for further test, and it is expected that some time in the future at least a few of these will take their place among commercial varieties and extend the season of apples of the Northern Spy type, and as they are hardier than the parent will extend the area over which this type can be successfully grown.

Time of bearing.—Northern Spy, which is late in coming into bearing, has given this characteristic to most of the seedlings. It is interesting to compare ninety-eight seedlings of Wealthy, which, however, are one year older, with the 100 seedlings of Northern Spy; the Wealthy, as is well known, being a very early bearer. It will be seen that all of the Wealthy seedlings had fruited when the Northern Spy began to fruit.

	Per cent. Fruiting.
Wealthy seed sown 1898—	
1903	1
1904	1
1905	19
1906	22
1907	11
1908	44
	98
Northern Spy seed sown 1899—	
1908	9
1909	4
1910	16
1911	34
1912	33
1913	4
	100

From this experience with Northern Spy as a mother we are led to believe that it is one of the best parents to use in cross-breeding. In the seedlings just described it has impressed its good characteristics on a large proportion of its progeny, although a self-sterile or partly self-sterile variety. The McIntosh apple has done the same, and this also is regarded as a very desirable parent.

POMOLOGY.

(M. B. Davis, B.S.A., *Assistant in Charge.*)

As the writer was not appointed to the Horticultural Division until after the growing season of 1913 was over, he was unable to take charge of the field experiments for that season, hence the matter which follows is the result of work done or information gathered since that time.

WINTER-KILLING OF CHERRY BUDS.

In view of the fact that the cherry crop has in the past been a very uncertain crop in this locality owing to winter injury of the fruit buds, it was decided to carry on a simple experiment this last winter in order to ascertain, if possible, at just what time or under what conditions the injury took place.

By gathering buds from the orchard at intervals during the winter and examining them carefully, the period of injury can be arrived at within very close range. At every gathering, three lots of buds were gathered, one lot being placed in cold storage at about 40 degrees, one placed in the greenhouse at 70 degrees, and the other being examined at once. In no case were the counts appreciably different. The lot placed in the greenhouse was allowed to stand in water until they blossomed, the lot in cold storage only remained there until they were thawed out; they were then taken to the greenhouse to blossom. With the exception that these were a few days later in blossoming, there appeared to be no difference in the lots.

This went to show that the sudden transference of the buds from a cold temperature to a warm temperature did not apparently do any injury, when the conditions of moisture were such that the buds could not dry out. In all, eight gatherings were made. The dates and other information in detail are contained in the following table.

It might be well to note that the first injury took place between February 26 and March 10, and that no injury took place after that date. It is also noteworthy that the buds withstood the 30° below zero weather of January and February without incurring any injury.

From the 21st of February to the 25th, we had a fairly severe cold spell with the thermometer well below zero. This was immediately followed on the 27th by a warm period, with day temperature nearly always well above freezing. The buds, during this period, received their injury.

PERCENTAGE OF INJURY, AND DATES OF GATHERING.

Variety.	Dec. 13	Jan. 5	Jan. 20	Feb. 5	Feb. 19	Mar. 10	Mar. 25
Amarelle Boquet	0	0	0	0	0	69·1	68·2
Brusseler Brain	0	0	0	0	0	68·	69·
Minnesota d'Ostheim	0	0	0	0	0	76·9	78·1
Vladimir	0	0	0	0	0	78·	76·3
Montmorency Ordinaire	0	0	0	0	0	71·1	73·
Cerise d'Ostheim	0	0	0	0	0	61·	59·
Griotte d'Ostheim	0	0	0	0	0	45·4	47·
Orel 24	0	0	0	0	0	38·2	39·5

The fluctuation in percentage of injury of March 10 and 25 is due, of course, to a probable error. In no case was it more than 2 per cent.

From this it would appear that in order of hardiness these varieties would stand as follows:—

Quite hardy—
1. Orel 24.
2. Griotte d'Ostheim.
3. Cerise d'Ostheim.

Only moderately hardy—
4. Amaralle Boquet.
5. Brusseler Braun.
6. Montmorency Ordinaire.

Not very hardy—
7. Vladimir.
8. Minnesota d'Ostheim.

Unless further injury takes place, we bid fair to have a moderately good crop of cherries, even on those varieties with 78 per cent of buds injured, for the remaining 22 per cent are sufficient, if all develop, to load the trees, there having been a very large number of fruit buds formed last year.

"DEHORNING" OF OLD APPLE TREES.

On March 10, a visit was made to the Niagara district in order to investigate some of the orchards which had been dehorned or vigorously headed back. A summary of the advantages and outcome of such treatment may not be out of place in this report.

Dehorning or heading-back of old trees has been advocated by many in the past as a means of rejuvenating an old and neglected orchard. There are many old orchards throughout the country where the trees are so high as to make it practically impossible to properly spray and prune them, hence the almost impossible task of attempting to control insect pests such as the San José scale. To overcome this difficulty, some growers cut their trees back about 8 to 10 feet, bringing them down to a height of 18 to 20 feet, where they could be properly cared for. To do this with such large trees meant, of course, the removal of some very large limbs, which gave rise to a doubt as to whether or not the trees could survive such treatment for any length of time.

The results obtained from two orchards in the Niagara district are very interesting indeed. One of the two orchards is that of Mr. Jos. Tweddle, at Stoney Creek, Ont. Here were found Baldwins, Greenings, and Spys, all dehorned. They had been dehorned for two years and to date show no signs of rotting at the cuts except in one or two instances where the cuts were carelessly made by the pruner. In some cases Mr. Tweddle had painted the wounds, and in other cases he had not. Although no rot was apparent in the unpainted cuts, yet it seems advisable to paint all wounds to keep out the weather and any possible infection from fungous diseases.

In the case of the Spys, some 8 to 10 feet had been removed, and the results attained were very satisfactory. Mr. Tweddle plans to dehorn during the year when he expects a full crop so that the trees will not be inclined to put out too much sucker growth. In the Spys, the sucker growth was not overabundant, but yet sufficient to give a large amount of new wood to select a new frame from.

Probably the most interesting was his Baldwin orchard. Here are to be found trees which two years ago had very little brush on them, and what they did have was

located on the tips of long branches, giving the tree the appearance of an old paint brush.

In this orchard, 5 to 6 feet only could be removed the first year, for if more had been taken there would not have been enough foliage left to carry on the work of the tree. At the time of the visit to the orchard, a great change had taken place. The old trees were practically rejuvenated. The result of the dehorning was that the trees put out a very vigorous growth of suckers, both on the tops and also well down to the main trunk. By selecting the best of these, Mr. Tweddle had formed practically a new tree and next year will be able to take 5 feet more off the top, thus bringing his trees down to the desired height. He will then have changed old tall trees with foliage on the tips of the branches into moderate high, spreading trees, with a reasonable amount of wood and foliage from the tips, right back to the main trunk.

In the case of the Baldwins, the amount of sucker growth was perhaps a trifle too much. This was due, no doubt, to the fact that owing to weather conditions, the crop was very light the year he dehorned instead of being heavy, as he had expected. This, of course, gave the trees a tendency to put out large amounts of sucker growth.

In the other orchard visited, that of Mr. W. H. Bunting, were found Kings, Baldwins and Greenings, all dehorned with excellent results, although the Baldwins in some cases had thrown out very large amounts of sucker growth.

SOME RECOMMENDATIONS IN REGARD TO "DEHORNING."

There are many old and uncared-for orchards throughout the country which could still be made to give profitable returns if a system of dehorning or heading-back was to be followed.

In these old orchards where new growth has long since ceased, it may be induced by a vigorous heading in during March or April. The amount that should be removed at the first dehorning depending on the condition of the tree. If the tree is one which has very little foliage, it cannot stand as vigorous a heading back as the one which has considerable, for enough foliage must be left to carry on the work of the tree.

The result of the heading-back will be to induce a large amount of sucker growth, and these suckers may be selected to form a new framework to the tree. After the suckers have become established, the remainder of the top may be removed and in a short time almost a new tree will result. Instead of having only a tree with bearing wood on the tips, the grower will have one with bearing wood all the way to the trunk.

There may be cases, however, where the neglected orchard has suckered out too much, owing to rich soil, and instead of being barren, is too thick. In this case many of the suckers will have to be removed and the remaining ones headed back to give the tree the proper shape. In a case like this the pruning would be better done in the summer, so as not to induce too much wood growth. These two distinct types of neglected orchards are found everywhere, and each requires different treatment.

In the one case are trees which are making no growth and producing no bearing wood, in the other case are trees which produce too much wood, and do not bear fruit on it, or if they do bear any, produce very poor fruit on account of the excessive shade produced by dense foliage and sucker growth.

WOUNDS.

All wounds made by the pruner should be well painted and if in a few years these have not healed over, they should again be painted. Use a lead and oil paint without any turpentine in it. The paint will fill up the pores of the wood and prevent any disease from getting established before the bark heals over.

OTTAWA.

SESSIONAL PAPER No. 16

COST OF PRODUCING SOME DIFFERENT HORTICULTURAL CROPS IN CANADA.

Considerable time was spent in compiling from reports and information gathered in various ways, the cost of producing some of the more important horticultural crops of this country. A summary of the information obtained is given below.

APPLES, PER BARREL.

New Brunswick.—As per information obtained from report of A. G. Turney, average for 1911, from four orchards, $1.07.

Ontario.—According to Robt. Thompson, 1911, $1.86.

Nova Scotia.—As per Report of Nova Scotia Fruit Growers' Association, 1911, $0.83 to $0.99.

British Columbia.—According to F. N. Hales, Armstrong, B.C., $0.75 to $0.93 per box, or per barrel about $2.25 to $2.79.

Quebec.—As per Prof. W. S. Blair, Superintendent Experimental Farm, Kentville, N.S., 1912, $1.12½ to $1.50. Central Experimental Farm, average for thirteen years, based on closely planted trees (Wealthy), $1.53.

PEACHES, PER BASKET.

Ontario.—According to Robert Thompson, St. Catharines, Ont., 39.6 cents.

GRAPES, PER BASKET.

Ontario.—According to Robt. Thompson, St. Catharines, 11.5 cents; according to J. F. Carpenter, Fruitland, Ont., 12·8 cents.

STRAWBERRIES, PER BASKET (1 QUART).

Ontario.—According to Robt. Thompson, St. Catharines, based on yield of 7,200 boxes per acre, 2·6 cents. Data from Dominion Horticulturist, based on yield of 6,000 boxes per acre, 3·6 cents.

POTATOES, PER BUSHEL.

Dominion Horticulturist.—Based on yield of 300 bushels per acre, 20·5 cents.

Dominion Field Husbandman.—Based on actual yield of 445 bushels per acre, 14 cents.

Manitoba.—Based on yield of 250 bushels per acre, by S. R. Henderson, Kildonan, Man., 17 cents.

New Brunswick.—Based on yield of 183 bushels per acre (average for province in 1913), 27·3 cents.

TOMATOES.

Ontario.—By the Ontario Vegetable Growers' Association Report, 1907, per bushel, 20·48 cents.

OTTAWA.

YIELDS OF STRAWBERRIES FOR YEAR 1912.

The season of 1913 being a very poor one for strawberries, owing to the late frosts, the yields of that year can hardly be accepted as indicative of the ability of the different varieties to produce a crop.

The season of 1912, however, was sufficiently good to make the yields of that year of some value. Following will be found a list of the twenty-five heaviest yielders. It will be noted that those marked with an asterisk are seedling varieties, originated by the Dominion Horticulturist. It is also worthy of note that the highest yielder by far, is Valeria, also that of the twenty-five best yielders out of some 388 under test, ten of the varieties are seedlings originated at this Farm. The size of the plots in each case was two rows, 3 feet part and 15 feet long with plants 1½ feet apart in the rows.

Variety.	Yield in pounds, Rate per acre.
*Valeria (per)	17,268
Parson's Beauty (per)	16,335
*Cordelia (per)	14,883
Dora (imp)	13,873
Lester Lovett (per)	13,612
*Portia (imp)	12,160
Bisel (imp)	12,108
Sutherland (imp)	12,056
Arnout (per)	12,030
*Mariana (per)	11,854
Commander (per)	11,680
Brilliant (imp)	11,667
Buster (imp)	11,641
Lovett (per)	11,113
Morgan's Favorite (per)	11,045
Thompson's Earliest (per)	11,028
*Desdemona (imp)	10,838
*Hermia (per)	10,812
*Viola (imp)	10,734
*Lavinia (per)	10,670
*Ophelia (per)	10,647
Scarlet Ball (imp)	10,501
Sunnyside (imp)	10,440
*Julia (per)	10,294
Greenville (imp)	10,138

In Bulletin No. 62, on Strawberry Culture, will be found a list of the best fifty varieties, giving the average yield of each for a period of from two to five years.

The following varieties are recommended for planting at the present time:—

Commercial.—Beder Wood (per); Warfield (imp); not suited to light soil: Williams (per); Parson's Beauty (per); Bisel (imp); Sample (imp); Buster (imp); Glen Mary (per).

Domestic.—Excelsior (per); Splendid (per); Senator Dunlap (per); Lovett (per); Ruby (per); Bubach (imp); Wm. Belt (per).

A MONTHLY EXPENSE SHEET FOR DISTRIBUTION AMONG FARMERS.

In order to place in the hands of the orchardist and fruit grower throughout Canada a simple system of recording the costs of growing different crops, an expense sheet has been prepared by this Division, a copy of which will be found on the accompanying page.

These sheets are for recording a monthly statement of manual and horse labour expended on the different operations in connection with fruit growing. Room is also given for recording the amount and cost of materials used.

In the form on the accompanying page will be noticed thirty-one columns. These are for recording the number of hours that the men and horses expend on the different operations day by day. To the right is a column marked "total hours for month." In this should be recorded the total number of hours spent on each operation. Multiply this by the value of the labour per hour and put the resulting figure opposite the operation in question, but under the column marked cost of "Labour and Materials."

This principle should be followed in regard to the materials, recording the kind and amount used and date when used, if wished, placing the value in the last column. When all items are entered, by adding them up one gets the total expenditure for the month.

These sheets will be sent free to any grower, upon application to the Dominion Horticulturist, Dominion Experimental Farm, Ottawa, Ont.

MONTHLY EXPENSE SHEET.

This Form is supplied free by Division of Horticulture, Dominion Experimental Farms, Ottawa, Ont.

Farm of..... Crop.....

Post Office.....

Record for Month of..... No. of Acres.....

Manual Labour.

Days of the month and hours worked each day.

Operations.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total hours for month.	Cost of labour and materials.
Scraping and Renovating.....																																	
Pruning.....																																	
Plowing.....																																	
Cultivating.....																																	
Thinning.....																																	
Picking.....																																	
Hauling and Marketing.....																																	
.....																																	
.....																																	

HORSE LABOUR.

| | | |

A NEW SYSTEM OF ORCHARD CULTIVATION.

Among the many systems of orchard cultivation which have been originated within the past few years, there is one which appears to be very worthy of mention. The system in question may be called the "Johnson Method." It was originated some seven years ago by Mr. E. H. Johnson, of Greenwich, Kings County, N.S., and is termed by him "the rotation of cultivation system." It consists of cultivating every other ridge while the remaining ridges are sown to clover or some other crop. This system alternates each year, that is, the ridge which is cultivated in 1912 is sown in mid-summer to clover and the following year is allowed to remain in sod. On the other hand, the ridge which in 1912 was in sod is ploughed in the fall or in the following spring and kept cultivated until midsummer, when it is again sown. Thus each ridge is cultivated every other year and is sown to clover crop every other year. The crop growing on the ridge in sod is kept mowed during the summer and allowed to remain on the ground as a mulch.

The following extract from a letter from Mr. Johnson will explain further this method, together with his arguments in favour of it. It may be added that this system is being largely adopted throughout Nova Scotia, and has given good results to date. Added to Mr. Johnson's arguments are the lessened cost of cultivation by this system over the clean cultivation method:—

> "I have used this rotation of cultivation system for six or seven years and have not yet gotten over the feeling that it looks slovenly, yet when harvest time comes I always feel well repaid for any worry I may have had in this direction.
>
> "I originated this system myself, and the two facts from which I deduced it are these: First, that an apple tree standing on a headland and only cultivated on one side apparently stood drought and gave just as good results as trees cultivated on both sides; second, when I ploughed an orchard that had stood in sod for some time I invariably got better results the first two years while I was getting the old sod rotted up, than I ever could get again either by using stable manure alone or commercial fertilizers alone, or by a combination of both. And now after six or seven years' experience with this method of cultivation, I feel sure that no other method suits the apple orchard that is in full bearing quite so well as the rotation system."

VEGETABLE GARDENING.

(C. F. W. Dreher, B.S.A., *Assistant in Charge.*)

Although vegetable gardening, or the growing of vegetables for experimental purposes, has always been a part of the work of the Division of Horticulture, it received special attention in 1913. In past years the testing of varieties of most kinds of vegetables has been the main feature of the work, and this was continued in the past season with the more staple crops, such as potatoes, tomatoes, peas, corn and cabbage, which are grown on large areas in the Dominion and which form the main revenue of many growers in certain sections. No doubt almost any crop might be taken and grown on an extensive scale where the soil, climate and market conditions are favourable and be just as important a crop as any of those mentioned above; among which might be mentioned onions, celery, asparagus, rhubarb and many others that have made men and districts rich and famous, and none of them have been neglected here. The desirability of any variety naturally depends on whether it is adapted to the prevailing climatic conditions, on the wishes of the market, local or otherwise, and on its ability to produce a good crop, the latter condition, of course, depending in no small degree on the source of seed. In comparing varieties with each other, the following chief factors and what is considered most important in connection with them are kept in mind, namely:—

1. Adaptation to climatic conditions.

2. Conformity to the demands of markets. This will be mentioned in connection with each crop separately, and also what methods have been followed at the Experimental Farm to attain the best possible results. Suffice it to say for the present, that, as in the past, the seed was ordered from a large number of seed firms, distributed over Canada, United States, England, Holland, Denmark, France, and Germany, wherever the dealers claimed to sell a superior product and had given satisfaction. From here, the seed was distributed to all the branch Farms in every province, and their results will be found in another part of this report.

In concluding the reference to the seeds, it should be mentioned that the seeds of certain crops, such as tomatoes, corn, peas, beans and potatoes have been produced and ripened in the Horticultural Division and imported seed and novelties are compared with the home-grown.

It may be well to repeat from previous reports something concerning the land on which most of the vegetables are grown since 1912. This is a 7-acre, rectangular field; the soil varying from a rich to a light loam. Thus, while certain of the vegetables prefer a distinctly different soil, the majority find therein a very congenial medium.

The treatment of the land consisted in shallow, fall ploughing, when half a dressing of manure, say 15 tons, was ploughed in over all the field, except where the potatoes were to be planted, in which portion a green crop of clover was turned under in the fall. The last ploughing was followed by the disc harrow. Before the latter operation, however, hotbeds were constructed for tomatoes, early cabbage, cauliflower, onion-sets, celery, melons, lettuce and beets. The preparation of these hotbeds is given in a pamphlet prepared by Mr. Macoun, the Dominion Horticulturist. Enough seeds are sown to provide a good choice at the time of the first transplanting, when only the actual necessary number is taken.

The list of vegetables in order of the time in which they were sown, or planted outside, is here published, and the results given in order of the relative importance of

the experiment, based on the number of varieties tested, or the area devoted to it in the field.

Thus, in order of earliness are: Lettuce, radishes, peas, onions, parsnips, early turnips, beets, carrots, salsify, parsley, potatoes, early cabbage, cauliflowers, tomatoes, corn, beans, cucumbers, squash, pumpkins, melons, late cabbage, Brussels sprouts, kale, late celery and turnips.

Asparagus and rhubarb being permanent crops, are not included in this list.

To do equally full justice to all these crops would have been impossible without more land, men, and equipment; therefore, the Dominion Horticulturist has for some years past paid particular attention to some of these, and the results obtained are decidedly conclusive and may serve as a guide to the extensive growers or market gardeners alike.

POTATOES.

One of these crops is the potato, which is still one of the most important here. The work carried on previous to 1911 has been published in Bulletin No. 49, the latest edition having come out in that year. The season of that year was very unfavourable to potato culture, and the crop was so poor that a new supply had to be purchased for seed purposes. Thus, in the table below, No. 1, the best varieties given represent only an average of two years, and may include varieties which other growers have not found profitable, while some may not be included that are very popular with a great many. The following list of the thirty varieties that have given the best yield in 1913, is interesting, but not reliable as a source of information.

The number of varieties tested in 1912, was 145, with a few seedlings. In 1913, 120 varieties and a few seedlings were tested. Besides, a number of samples that were sent from the branch Farms for identification, and several from individuals sent as donations were put under test in comparison with the others. It might be added that the majority of the varieties gave yields somewhat below the average, this being due to the exceedingly dry weather during that part of the season when the tubers should be forming, the effects of which were the more pronounced owing to the light nature of the soil. The tops, however, made a splendid growth and seldom has there been such an abundant bloom on most of the varieties. The potato beetles were easily controlled by repeated sprayings of Bordeaux, poisoned with Paris green and arsenate of lead, in the proportions of 8 ounces Paris green and 1½ pounds arsenate of lead to 40 gallons Bordeaux mixture (6-4-40). The Bordeaux mixture easily checked what little blight there was. Rhizoctonia also was very limited.

The potatoes were treated with a weak solution of corrosive sublimate 1-1000, before planting, cut in halves, when dry, and the sets planted immediately in furrows, 66 feet long, 2½ feet apart, 1 foot apart in the furrow, and covered 4 to 5 inches deep. Before and again just when the potatoes began to sprout, the land was harrowed in order to loosen the surface, and kill the germinating weeds. Ridge culture was adopted, that is, just before the vines began to spread on the surface, a double mould-board plough was passed between the rows, forming ridges in which the tubers developed, and the soil was kept cultivated throughout the season.

SESSIONAL PAPER No. 16

TWELVE MOST PRODUCTIVE VARIETIES OF POTATOES.—Average of two years, 1912-13.

AVERAGE YIELD.

Varieties.	Yield in bushels per acre.	
	Marketable.	Unmarketable.
Empire State	347·6	48·4
Houlton Rose	347·6	44·0
Rochester Rose	337·½	60·½
McIntyre	334·4	50·6
Green Mountain Junior	332·2	46·1
Table Talk	327·8	67·2
Clyde	325·6	56·1
Carman No. 1	318·½	55·0
Burpee's Extra Early	300·3	56·1
Dalmeny Hero	299·2	118·9
Delaware	297·5	486·0
Eureka Extra Early	283·8	81·4

THIRTY of best Varieties season 1913.

Varieties.	Record Number.	Yield in pounds.		Yield in bushels per acre.	
		Marketable.	Unmarketable.	Marketable.	Unmarketable.
Reeves' Rose	2594	72½	13	319·0	57·2
Empire State	2627	59	10	259·6	44·0
Houlton Rose	2605	58	6	255·2	26·4
Manistee	2612	55	5½	242·0	24·2
Early Hebron	2611	53	7½	233·2	33·0
Dalmeny Regent	2626	52	9	228·8	39·6
Rawlings Kidney (Ashleaf Kidney)	2616	52	7	228·8	30·8
Late Puritan	2629	51½	11	226·6	48·4
Brydon	2625	51	9	224·4	39·6
Dalhousie Seedling	2608	50½	10	222·2	44·0
Green Mountain Junior	2620	50	11	220·0	48·4
Hard to Beat	2589	50	6½	220·0	28·6
American Wonder	2664	49½	5	217·8	22·0
Warrior	2624	46	12	202·4	52·8
Royalty	2631	46	27	202·4	118·8
Clyde	2695	46	14	202·4	61·6
Seedling No. 1	2592	45	8	198·0	35·2
Morgan Seedling Pink	2593	45	8½	198·0	37·4
Brydon's Beauty	2596	45	7	198·0	30·8
Early Ohio	2694	44½	12	195·8	52·8
Superlative	2588	44	11	193·6	48·4
Wee McGregor	2640	43	16	189·2	70·4
McIntyre	2724	43	7	189·2	30·8
Early Rose	2599	42½	11	187·0	48·4
Scottish Triumph	2672	41	10½	180·4	46·2
Sir Walter Raleigh	2680	41	5	180·4	22·0
Silver King	2614	40½	6	178·2	26·4
White Chief	2584	40	5	176·0	22·0
Carman No. 1	2586	39	15	171·6	66·0

TOMATOES.

This being a crop upon which every market gardener relies for a considerable portion of his revenue, it has been one of the main experimental crops. It is hard enough for the grower to know the merits of all the standard varieties without having to include numerous novelties introduced by the seed dealers, under various names. About seventy named varieties have been under test during the last season, a few of which were obtained from as many as eight different sources. Twelve strains of the Earliana tomato, including the famous Langdon's Adirondack and our own selection, the Alacrity, as well as the better known Sparks' Earliana, etc., were tested.

The experimental varieties were sown on the 10th of April, in the hotbeds, transplanted into strawberry boxes on the 28th, put into cold frames and transferred from there to the field on the 30th of May. The plants were then in the best of condition, stocky, the foliage just reaching to the sash of the frame. The distance of planting in the field was 4 feet apart each way. The ground was cultivated and hoed till the growth of the plants made this impossible.

As to the table No. 3, of the best, early, medium early, and late varieties here published, the following facts must be borne in mind:—

1. The results are from one season only.
2. Only five plants of each variety were planted.
3. The plants had a check from the cold nights early in June, when they had just been planted.

Finally, all the plants were killed by frost on the 15th of September, for these reasons, the yield of ripe fruit, even from five plants is small, and some varieties which have proven to be early before, may appear late, when judging by the column giving the first date of picking, although the other figures will support their actual value.

As in other years, an experiment was also carried on with staking tomatoes *vs.* unstaked, in the field, but the results are reserved for another time. In general, it may safely be stated that staked and pruned vines have given larger and more uniform fruit, ripening somewhat earlier, depending much on the location. The loss in quantity by pruning is counterbalanced by the size, weight, and quality of fruit.

List of the best Tomatoes, 1913.

Varieties.	Date of first picking.	Number pounds picked first two weeks.	Total yield ripe fruit.	Yield of green fruit.
		Lb. Oz.	Lb. Oz.	Lb. Oz.
Earliana (Bonskill)	August 11	27 14½	44 13½	19 0
Sparks' Earliana	" 11	20 6¾	67 0	10 13
Strain of Earliana	" 14	18 7	49 6	15 0
Alaerity, 2-24-10, Central Exp. Farm	" 14	15 5¾	64 15¾	13 4
Extra Early Wealthy	" 11	12 11	54 7	20 12
Northern Adirondack No. 3	" 14	14 ½	44 2	15 9
Manitoba Grown (Stevenson)	" 11	12 10¾	55 4	8 6
Bonny Best	" 14	13 6½	39 5½	11 11
MEDIUM EARLY.				
Jack Rose	August 18	24 4½	55 13½	18 15
Earliana (Northern Grown)	" 11	7 12	53 10	15 2
Grown for North	" 11	8 12	53 1½	15 11
Selected Earliana	" 20	14 8½	52 3	31 14
Crimson Cushion	" 20	15 6¾	46 3	26 12½
Field's Early June	" 11	10 8¾	51 7	26 9
June Pink	" 14	11 10½	46 2	34 14
First and Best	" 18	15 1½	44 13	26 14
Prosperity	" 20	8 1	44 10	24 12
LATE.				
Duke of York	August 18	1 3	17 15	34 16
Blue Stem Early	" 20	6 7	22 4	33 3
Dreer's Superb Salad	" 25	9 9	15 11	32 5
Livingston's Coreless	" 28	2 8	6 7	32 15
Hipper No. 2	" 20	2 8	10 7	30 9
Santa Rosa	" 20	2 5	9 11	30 3
Dwarf Champion	" 28	4 11	6 11	30 0
Livingston's Globe	" 18	7 8½	17 10¼	30 0
Greater Baltimore	" 18	7 15	19 2	29 3
Magnitude	" 18	5 2	11 0	28 2
Livingston's Hummer	" 18	5 7	8 3	27 8
Red Rock	" 20	2 5	11 3	24 7

PEAS.

Many growers are confronted with the same difficulties in choosing suitable varieties of garden peas, as with the tomatoes, because of the large number of varieties on the market.

The latest summary of the work done with peas is given in the 1910 report, with a table of the best varieties taken from an average of three years. The same methods as are described there have been continued since, that is: The varieties that have proven superior to the others are tested out in 100-foot rows, the peas being planted by hand 1 inch apart in the small furrows. The other varieties are sown in rows 30 feet long, and 3 feet apart like the others. Seventy-four varieties were tested last year, including the recognized varieties on the market, and several novelties. The varieties in the 100-foot rows are picked green, while the others are allowed to mature after all notes are taken, and the seed from these is used for the following season. We hope to show, in time, some interesting results from comparisons of home-grown with imported seed, of as many vegetables as the seed of which can be saved in our climate and under our conditions.

OTTAWA.

Meanwhile, a table is here published giving the best early, medium early, and late peas, for an average of three years, *i.e.*, seasons 1911, 1912, and 1913, which does not differ very much from former results published. In the list of the six best varieties of the three different grades, for 1913 alone, however, several varieties are introduced which deserve attention, such as: Sutton's Early Giant, Nott's Excelsior, Little Marvel, and Dainty Duchess. There are others too, which should be included, such as Gradus, Green Gem, Large Podded Alaska, for early varieties; Quite Content, Telephone, Rivenhall Wonder, Witham Wonder, Mayflower, for a medium: and Cracker Jack, Burpee's Quality, Up-to-Date, for late varieties.

For a continued cropping of green peas, it is preferable to sow varieties of good yield, and quality, that vary in the length of time they take to develop a crop, rather than making successive sowings of the same variety, and for choosing such varieties, the above mentioned, and the tables, will serve as a guide. Only varieties of good quality are recommended.

BEST VARIETIES of Peas, an average for 1911-13.

Varieties.	Average number of days from time sowing till picking.	Average number of green pods in 100-foot row, 1911-13.	Quality.
	Days.	Gallons.	
Early—			
Thomas Laxton	54	5¼	Good.
Child's Morning Star	52	5½	Very good.
American Wonder	56	5½	" "
Gregory's Surprise	54	5½	" "
Premium Gem	57	4¼	" "
Hundred Fold	57	4	" "
Medium Early—			
McLean's Little Gem	67	7½	" "
McLean's Advancer	63	6½	" "
Boston Wrinkled	67	6½	Good.
Burpee's Quantity	66	4¼	"
Pioneer	61	3	"
Sutton's Excelsior	61	2¼	Very good.
Late—			
Perfection Marrowfat	73	8½	Very good.
Heroine	75	8½	" "
Juno	71	8½	Good.
Stratagam	73	5¼	"

BEST VARIETIES of Peas in Year 1913.

Varieties.	Record Number.	Number days from sowing time to first picking.	Number of pickings.	Percentage of crop picked first time.	Length of Straw.	Total crop per 100-foot row.	Quality.
		Days.		%	Inches.	Gal.	
Early—							
Child's Morning Star	0-2348	53	4	34·78	32	5¾	Good.
First of All	0-2352	53	4	11·11	27	5¾	Fair
Gregory's Surprise	0-2346	55	5	38·46	35	6½	Good.
Sutton's Early Giant	0-2350	56	5	10·30	25	7¼	"
Nott's Excelsior	0-2358	56	4	35·71	28	3½	"
Thomas Laxton	0-3251	56	3	27·27	30	5½	"
Medium—							
American Wonder	0-2357	57	4	16·66	28	6	Good.
Sutton's Excelsior	0-2361	58	4	18·75	16	4	"
Premium Gem	0-2354	59	4	13·33	22	7½	"
Little Marvel	0-2375	62	2	72·72	24	2¾	"
Perfection Marrow	0-2379	66	3	22·22	27	7	Fair.
Burpee's Quality	0-2377	66	5	14·28	40	10½	Good
Late—							
McLean's Advancer	0-2359	67	3	22·22	9	9	Fair.
Stratagem	0-2382	69	2	70·00	28	5	"
Dainty Duchess	0-2365	69	4	58·82		10½	Good
Heroine	0-2380	69	4	21·05	40	9½	"
Boston Wrinkled	0-2872	71	4	42·85	60	8½	"
Lincoln	0-2373	73	3	69·56	28	5¾	Fair.

BEANS.

In the farmer's list of the best vegetables given in previous reports, a few of the best yellow-podded and green-podded bush varieties are indicated. In the accompanying list in this report, these are included among some others which have proven the best in the test plots. Here again, others might be mentioned that have been only recently tried and that so far have done well. They shall be published in subsequent reports.

The early varieties took from fifty-three to fifty-seven days from time of sowing till they were ready for use; the medium early, fifty-seven to sixty-eight days, and the late varieties from sixty-eight to eighty-two days. The variety Challenge Black Wax has been selected, at Ottawa, for earliness since 1905 for those parts of Canada where the season is much shorter than elsewhere. It is also a prolific yielder but somewhat susceptible to anthracnose. Altogether, sixty-five varieties were tested in 1913.

Varieties.	Colour	Shape of pod.	Yield of ripe beans.	
			Lbs.	Oz.
Early—				
Challenge Black Wax	Yellow	Flat	1	3
Grennell's Pencil Pod	"	Round	1	9
Oreer	Green	Flat	1	7
Early Red Valentine	"	Round	1	4
Davis Wax	White	"	1	4
Michigan White Wax	Yellow	Flat	0	11
Wardwell's Kidney Wax	"	"	1	7
Golden Wax	"	"	1	8
Medium—				
Round Pod Kidney Wax	Yellow	Round	1	2
Improved Black Wax	"	"	1	4
Refugee	"	"	1	7
Dwarf Chocolate	Green	Flat	1	12
Sure Crop Stringless Wax	Yellow	"	2	5
Dwarf Rustproof	"	Round	1	6
New French Dwarf	"	"	1	14
Horticultural Dwarf	"	Flat	1	14
Late—				
New Hodson Wax	Yellow	Round	1	3
Golden Refugee	Golden wax	Flat	0	3
Kentucky Wonder	Green	Round, uneven	1	14

SWEET CORN.

From the commercial standpoint this crop is a secondary one when sold on the cob. What importance it plays in the canning industry is a different thing in certain districts. We have mainly concerned ourselves here to find out which are the best varieties for the market-gardener who grows this crop in order to supply the local market. Experiences vary as to this latter question, and several varieties are popular with different growers. In the season of 1913, forty-five were grown and a table is published of the best early, medium and late varieties for that season and also one of the best for an average of three years, that is 1911-13.

CORN.—Best Varieties.—*Early, Medium, Late.*—1913.

Varieties	Number of days from sowing time till ready for use	Total yield of marketable ears from twelve hills.	Length of ears.	Height of stalks.
			Inches.	Ft. Ins.
Early—				
Early Malcolm	79	43	5½	4 8
Ringleader	79	39	5¾	5 1
Malakoff	80	33	5	4 0
Early Iowa	78	32	5⅞	4 2
Early Dawn	78	30	5⅝	4 2
Pocahontas	79	29	5¾	4 10
Medium—				
Carpenter's Golden Sweet	88	36	6	4 11
Early Fordhook	88	34	6	4 6
Early White Cory	88	31	4·5	0
Seymour's Sweet Orange	88	28	5¾	4 11
Earliest Catawba	88	28	5½	4 9
Early Metropolitan	88	28	5	6 1
Crosby's Early	88	25	5¾	5 11
Golden Bantam	92	26	5¾	4 1
Late—				
Howling Mob	100	42	6¼	5 1
Golden Rod	100	38	5¾	4 11
Golden Cream	100	34	5¾	5 0
Golden Nugget	100	31	5¾	5 0
Golden Gentleman	100	31	5¼	5 0
Rennie's XXX Early Sweet	100	30	5½	5 1

The variety Early Cory, whether called Early or Extra Early, or simply Cory, has given us results varying to some degree in earliness. It was obtained from several seedsmen, and while a few were fairly early, the majority were decidedly medium early only.

"Golden Bantam" is a popular variety, but is somewhat late here, and had a small yield. The same applies to "Country Gentleman."

Of the forty-five varieties tested, only twelve were early, fifteen medium early, and the rest late. Among the latter are: Stowell's Evergreen, Stabler's Early, Early Cosmopolitan, Zig Zag Evergreen and Cream and Honey.

OTTAWA.

CORN, 1911-13.—Best Varieties.—*Early, Medium, Late.*—Average 1911-13.

Varieties.	Number of days from sowing till ready for use, 1911-13.	Average yield marketable ears from 12 hills, 1911-13.	Average length of ears, 1913.	Height of stalks, 1913.
			Inches.	Ft. In.
Early—				
Malakoff	80	50	6	4 0
Peep-o-Day	81	46	5¾	5 0
Early Iowa	80	40	5⅞	4 2
Medium—				
Carpenter's Golden Sweet	90	57	6	4 11
Seymour's Sweet Orange	91	56	5¾	4 11
Early Hiawatha	94	54		
Early Metropolitan	94	54	5	6 0
Pocahontas	88	43	5⅝	4 10
Golden Nugget	95	43	5½	5 0
Early Cory	85	41	5¼	4 10
Early Fordhook	88	41	5¼	4 6
Crosby's Early	93	35	5¼	5 11
Premo	89	35	5⅛	5 0
The Chase	95	26	5½	4 0
Late—				
Golden Rod	100	54	5⅛	4 11
Golden Gentleman	97	45	5⅛	5 0
Ideal Early	98	44	6	5 10
Howling Mob	98	43	6¼	5 1
Early Cosmopolitan	99	36	5¼	5 4
Perry's Hybrid	106	36	5·2	5 ¼
Stabler's Early	103	36	6¼	5 2
Early Evergreen	102	31	6	6 0

In the table for 1911-13, the number of early varieties is limited because a great many had not been grown for three seasons in succession.

As to cultural methods followed, it might be said that the corn was sown on the 27th of May, in hills, as nearly as possible six grains to each, and twenty-four hills to each variety. Cultivation was done in the usual manner, and when the plants were about 8 inches high, the hills were thinned out to three plants. The yield in ears is taken from the twelve best hills, and the measurement of stalks and ears from representative samples.

CABBAGE.

Which is the earliest variety of cabbage is a somewhat disputed question, some claiming it is the Early Jersey Wakefield, others the Early Copenhagen Market or Early Paris Market. The results obtained at the Experimental Farm are not published this year because the figures obtained, although interesting, are not conclusive, even for one year's experiment. Drought and the root-maggot reduced the yield considerably, as much as 86 per cent of the crop failed with two of the varieties, and none escaped with less than 23 per cent failure. Therefore, it is hard to judge the merits of these varieties. Reliable early varieties though, are the Early Jersey Wakefield, and a few of its strains, the best being the Large Wakefield, Early Charleston Wakefield; the heads of the latter, though, are much smaller. Of the same type

as the Wakefield is the Paris Market, very early, which is very good. Copenhagen Market and the Norseman, with roundish heads, are also early, followed by Danish Summer Ballhead and Roundhead, as second early varieties.

The Early Cauliflower has been a failure entirely the last season, because of the hot, dry spring. Tar-felt-paper discs preserved them from the attack of the root-maggot.

Both early cabbage and cauliflower were sown in hotbeds on the 12th of April and transplanted into cold frames eleven days later, where they remained until the 25th of May. In the field the plants were planted in rows 30 inches apart, and 18 inches in the row, and were given the usual cultivation and hoeing.

Late Cabbage.—The season for this was on the whole more favourable than for early cabbage. The growth was somewhat checked during the early part, but later when there was plenty of moisture the heads developed almost too fast. Twenty-one varieties were tested. The best and earliest of the late varieties are: German Nofalt, which is small to medium in size, roundish and compact; Magdeburg, with very much the same description, followed in earliness by the Flat Swedish, which forms large, solid, flat heads, with outer leaves somewhat spreading; the Danish Roundhead, which this year gave small round heads, enclosed by a mass of strong, erect outer leaves; Headwell, medium large, flat and attractive; Autumn Winter, which is of the same type as Premium Flat Dutch; to be followed perhaps by still later, but good sorts, such as the Late Stonehead, medium in size, round, spreading outer leaves; Corn Belt, a large, flat variety with compact heads; and the Volga, which is medium large, and also compact.

Good varieties of red cabbage are: Extra Blood-red Drumhead, Red Danish Stonehead, and Danish Round-Red.

Late Cauliflower.—In general, the season for this crop was not favourable, the heads began to develop too late in the season, and, with many, the growth was cut short by the early fall frosts. The results, however, were fairly conclusive, and as follows: According to the number of marketable heads produced, "Dry Weather" heads the list, with an "Early Snowball" as second. The latter, though, is much preferable in shape and keeping qualities of the flower head; on the other hand, "Early Snowball" received from other sources than this first one, has produced a very small number of marketable heads, showing the importance of a good strain. Gilt Edge, Copenhagen Market, and All the Year Round follow the first mentioned, while Dwarf Erfurt, and its strains, come about in the middle of the list. The actual figures, though, will not be published for some time yet.

As to the manner of shading the heads, tying and breaking the leaves over them have been tried and it has been found that during the earlier part of the season, when the days are still hot and dry, tying is much better, while later on, and during wet weather, this method shades the heads too much, and is apt to spoil their appearance, especially when the green cabbage worm is present.

BEETS.

Markets require different types of beets in different places; thus, while some demand the flat beet, others want a more roundish sort. A list of a few of the best of each type is published, with the description of form and colour of flesh.

Generally speaking, beets with dark flesh are better than those that show large white rings, such as the Bonfire beet or Crimson Globe. As to the variety named

"New Beet of Holland," the seed was sent gratis for test from Burpee, and it has given excellent results this year.

Varieties.	Description.		
	Shape.	Flesh.	Quality.
New Elite Egyptian	Flat, angular	Dark red	Very desirable.
Egyptian Dark Red	" "	"	Desirable.
Ruby Dulcet	"	"	"
Early Egyptian	" angular	"	"
Crosby's Egyptian	" "	"	"
New Beet of Holland	Roundish	"	Very desirable.
Bonfire Beet	Globular, conical	"	Desirable.
Blood Turnip Beet	" "	White rings	"
Early Model	" "	Dark red	Very desirable.
Crimson Globe	" "	Light red, white rings	Desirable.
Black Red Ball	"	Dark red	Very desirable.

CARROTS.

As with beets, type and quality are more important than yield. With proper care and cultivation, and good seed, almost any variety should give a satisfactory yield. It is true, though, that not all of that yield will be equally good for market. As to types, the following have been grown and can be recommended: The Chantenay, Half Long Scarlet, The Chantenay Model, or Favorite, Half Long Danvers, Amsterdam, Half Long Scarlet, and Oxheart, which is a short and thick carrot, rounded at the tip, and of very good quality.

ONIONS.

These have been an entire failure this year, owing to the very unfavourable season for onions, that is, exceedingly dry and hot in the beginning and continual wet weather later on, which started them growing and caused practically the whole crop to develop into thick necks. This was even more pronounced with the transplanted onions.

As to the varieties, the following are recommended: Large Wethersfield, Yellow Globe Danvers, Prizetaker, Australian Brown, and Ailsa Craig. Of these, the two second last mentioned should be sown in hotbeds and transplanted, especially in districts with similar climatic conditions as ours, in order to hasten their maturity.

LETTUCE.

This was one of the first crops sown outside, the seed being sown on the 12th of May. Twenty-one varieties were tested in rows 15 inches apart, the lettuce being thinned to 4 inches in the row.

Of the head or so-called cabbage lettuce, those varieties that are earliest, most attractive, and remain in good condition the longest, are: Iceberg, Giant Crystal Head, Brittle as Ice, Improved New York, Wonderful, Tenderheart, and Selected Nonpareil. The second early, but good varieties of the same type, are: Wayahead, Salamander. Of the curled lettuce, Grand Rapids is easily the best, but Black Seeded Simpson, the Morse and Hanson's Improved lettuce have strong points in their favour. They are not so large, and are perhaps of a better quality than Grand Rapids.

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RADISHES.

Although small in importance to the truck-gardener, radishes nevertheless form one of the smaller crops which in aggregate mean surprisingly much for the gardener supplying the local market.

Of the best thirty varieties tried here, the seed of which was sown on May 12th, the following list gives the best with a brief description of same.

Varieties.	Description.			
	Earliness.	Size.	Shape.	Colour.
Red Ones—				
Scarlet White Tipped	Medium	Medium	Roundish	Scarlet-white tip.
White Tip Scarlet Gem	"	"	"	Light red.
Rapid Red	Very early	Small to medium	" and conical	Scarlet.
Earliest Scarlet	Early	" "	"	Light red.
Tip Top White Tip	Late	Medium	"	Scarlet, white tip.
Early French Breakfast	Medium early	"	Olive shaped	" "
Sparkler	" "	"	Roundish	" "
Red Rocket	Very early	Large	Conical	Red (attractive).
Earliest Red May	Early	"	"	Scarlet red.
Boston Market	Very early	Medium	Olive shaped	Scarlet red, white tip.
White Ones—				
New White Icicle	Early	Long and slender		White (good quality).
Earliest White May	"	Large	Conical	White.
White Rocket	"	Medium	"	"
White Lady Finger	Late	Long	Slender	"

CUCUMBERS.

The testing of varieties with this crop was carried on in the field where hills were prepared and the seed sown on the 6th of June outdoors, three hills to each variety, and these thinned out to three plants per hill, the hills being 6 feet apart each way.

Under these conditions, the following are some of the earliest and best: Fordhook Famous, Earliest of All, Extra Early Russian, Noroton Selected White Spine, Improved White Spine, Davis Perfect, and Cool and Crisp.

SQUASH.

Pumpkin, squashes and vegetable marrows were sown in hills in the field, two hills to each variety, and the hills 9 feet apart, each way. The following varieties of each are recommendable.

Pumpkins.—Sugar Pumpkin, Connecticut Field Pumpkin.

Squash.—Hubbard Squash, Golden Hubbard, Boston Marrow Squash, and Delicata.

Vegetable Marrows.—Long White Bush, White Trailing. As yet no particular attention has been given to the keeping qualities of these, or others; general experience, though, is that those mentioned are all good keepers.

The Convention of the American Vegetable Gardeners at Toledo, and that of the Ontario Vegetable Growers' Association, at Toronto, were attended during the year, and visits paid to several progressive market-gardening sections of western Ontario.

Ottawa.

ORNAMENTAL GARDENING.

(F. E. Buck, B.S.A., *Assistant-in-Charge.*)

In a rapidly-developing country it is only natural that a large number of the inhabitants should have a keen interest in the making of homes with home-like and attractive surroundings. The Dominion Experimental Farm system, from its inception, has encouraged the making of such homes. This is due to the fact that at the Central Farm at Ottawa, as well as at several of the branch Farms in the East and the West, investigational work was carried on in connection with trees, shrubs, and flowers. Such work consisted mainly in finding out the most suitable and hardy varieties of these plants for the varied and wide areas of the Dominion. At the present time, an ever-increasing number of Canadians seek information on these subjects, and the work which is carried on at the Central Farm at Ottawa, in order to supply such information, is now described by the term "Ornamental Gardening."

As this is the first occasion when such work has been dealt with in the annual report of the Farms, as a unit or at any length, it may be wise to refer to it in two aspects. In the first aspect, much of it is, as suggested, a continuation of lines of work started soon after the Farms system came into existence. In the second aspect, many of the phases of the work in ornamental gardening may be regarded as comparatively new. As originally developed, the work aimed to meet more particularly, general requirements, or those arising from the general spread of population.

Whenever houses were built or towns came into existence, information was sought with regard to such general subjects as lawns, flowers, shrubs, trees, windbreaks, etc., and the suitability of such things for various climatic conditions. To-day, however, there is, in addition to this desire for information along broad general lines, a constantly increasing desire for more specific information. This desire manifests itself in requests from Canadians of various types. There is, for instance, the private individual seeking information on special subjects, and the commercial man also seeking information on specific subjects.

It may be assumed, therefore, from the fact that a desire for specific information is increasing, that many more Canadians are able, more so now than formerly, to take an interest in the amenities of life which are fundamentally associated with beautiful homes and a pleasant, prosperous country. Changes in the character of large tracts of country are brought about chiefly by the efforts of the individual. The changes made by the inhabitants of prairie districts who have transformed such districts, by the judicious planting of trees and shrubs, are remarkable, but no less remarkable are the changes which are to-day taking place in many towns and cities. Such changes are also largely the result of the efforts of the individual, working either alone or uniting his efforts with other members of societies organized for home and city improvement. Work, however, of this character is always undertaken with greater confidence and keenness when those interested in it can obtain, without undue trouble, necessary information and advice.

The Horticultural Division of the Dominion Experimental Farms has supplied information to many thousands of correspondents in all parts of the Dominion on many varied questions connected with the foregoing subjects. In addition to supplying information by direct correspondence, the Division also aims to convey that information by means of the printed report and bulletins, and following is a list of articles and bulletins which have been issued so far on these subjects:—

"Catalogue of the Trees and Shrubs in the Arboretum and Botanic Garden at the Central Experimental Farm, Ottawa, Ontario, Canada," by Dr. Wm. Saunders and W. T. Macoun, Bulletin No. 2, Second Series, 1897.

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"List of Trees and Shrubs tested in Manitoba, Saskatchewan and Alberta," by Dr. Wm. Saunders, Bulletin No. 47, 1904.

"List of Herbaceous Perennials tested in the Arboretum and Botanic Garden, Central Experimental Farm, Ottawa, Canada, with descriptions of Flowers, and Other Notes," by W. T. Macoun, Bulletin No. 5, Second Series, 1908.

"Hardy Roses, Their Culture in Canada," by W. T. Macoun, Pamphlet 9, 1913.

In addition, articles relating to perennial flowers, and trees and shrubs have appeared in several of the annual reports, and are as follows:—

Articles Relating to Perennial Flowers.

Report 1896—"Notes on the Pæony and Iris," by Dr. Wm. Saunders.
Report 1897—"List of One Hundred of the best Perennials," by W. T. Macoun.
Report 1898—"Additional List of Herbaceous Perennials," by W. T. Macoun.
Report 1899—"List of Additional Good Perennials," by W. T. Macoun.
Report 1902—"List of Best Spring Flowering Perennials," by W. T. Macoun.

Articles Relating to Ornamental Trees and Shrubs.

Report 1893—"List of Ornamental Trees and Shrubs in Groups and Clumps on the Central Experimental Farm," by Dr. Wm. Saunders.

Report 1895—"List of Desirable Roses," by Dr. Wm. Saunders.

Report 1895—"Trees and Shrubs, Dates of Blooming," by W. T. Macoun.

Report 1897—"List of One Hundred Hardy Ornamental Trees and Shrubs," by W. T. Macoun.

Report 1897—"List of Hedges at the Central Experimental Farm," by W. T. Macoun.

Report 1900—"Descriptive List of the Best Woody and Annual Climbers," by W. T. Macoun.

Report 1901—"Descriptive List of the Different Species and Varieties of Lilacs," by W. T. Macoun.

Report 1903—"List of Deciduous Trees, Shrubs and Climbers with Attractive Foliage, Bark and Fruit," by W. T. Macoun.

Report 1904—"List of the Genera of Trees and Shrubs in the Arboretum, with Number of Species of each," by W. T. Macoun.

Report 1906—"List of the Best Thirty Ornamental Flowering Shrubs," by W. T. Macoun.

Report 1906—"Notes on Trees Growing in the Forest Belts of the Central Experimental Farm," by W. T. Macoun.

Report 1909—"List of Best Twenty-five Hardy Ornamental Deciduous Trees," by W. T. Macoun.

Report 1909—"List of Best Twenty-five Hardy Evergreens," by W. T. Macoun.

Report 1909—"List of some of the Best Lilacs," by W. T. Macoun.

Report 1910—"List of the Best Philadelphus," by W. T. Macoun.

Report 1911—"Notes on Trees in the Forest Belts at the Central Experimental Farm," by W. T. Macoun.

Report 1912—"Hardy Roses and Their Culture," by W. T. Macoun.

In addition to these bulletins and articles in the yearly reports, referring to the work as carried on at Ottawa, occasional notes have also appeared in the annual reports relating to the progress of this work at the branch Farms.

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RELATION OF THE OLD WORK TO THE NEW.

In order to make as clear as possible the present status of the work in ornamental gardening and the reason for its inheritance of certain lines of work, the following brief notes are given:

The Arboretum and Botanic Garden, which occupies about 65 acres of land, was in charge of the botanist, the late Dr. Fletcher, until 1895. In that year it passed into the charge of Mr. W. T. Macoun, and from that date until the year 1910 it was included in the Horticultural Division. Most of the foregoing articles were from notes taken from plants growing in that place. In 1910, the Arboretum was taken over by the Division of Botany.

The ornamental grounds and part of the nurseries were for many years under the supervision of the late Director, Dr. Wm. Saunders.

Forestry work, as carried on in the forest belt surrounding the Experimental Farm, has been looked after by the Horticultural Division for many years. In these belts there are some twenty thousand trees of some sixty different varieties.

These statements indicate, therefore, that the work in ornamental gardening as at present organized inherits some of its interests directly from the Horticultural Division, of which it forms a part, and some from other Divisions of the Central Experimental Farm.

AREA DEVOTED TO ORNAMENTAL GARDENING AND FORESTRY.

1. The ornamental grounds and the main road.
2. The ornamental hedges.
3. The rose garden and test garden for perennial and annual flowers, etc.
4. The nurseries for ornamental trees and shrubs.
5. The forest belt.

The area occupied by the ornamental grounds and nurseries is about 32 acres, and that occupied by the forest belt about 21 acres.

EXTENSION WORK WITH ORNAMENTAL PLANTS.

A brief note seems also advisable here to place on record the extensive nature of the work with ornamental plants. The work has extended to all parts of Canada, through these branch Farms, public institutions, etc., to which quantities of material have been sent to be tested for hardiness and general suitability for local conditions.

The bulletin on "Trees and Shrubs tested in Manitoba, Saskatchewan and Alberta," bears evidence of this. This extension work is of great value in many instances and particularly in two ways: first, it has been the means of supplying the Central Farm with knowledge which is needed in order to supply information, procurable perhaps in no other way, to a constantly increasing number of persons seeking such information; and second, it has acted as an incentive both to public bodies and the individual to beautify both the city and the home surroundings. This has been particularly true of homes in the prairie provinces.

In this regard the Central Experimental Farm system may be looked upon as the pioneer in the work relating to ornamental trees, shrubs and flowers, and the appearance of such plants in many parts of Canada badly in need of the ameliorating influence of attractive forms of plant life. The function of the Farms is to test the suitability and hardiness of varieties of ornamental plants. No provision of funds is available enabling a distribution of plants to the private individual, but on the branch farms, as well as at Ottawa, it is the aim to grow such plants as suit best the local conditions and needs. The residents of such districts knowing what will thrive, are

not discouraged in their efforts by buying in the dark what is tender or unsuitable for their requirements. When people know that beauty is possible in landscape design, and home surroundings, and obtainable at small cost, they seldom fail to seek after it. The people of Canada are now at that stage when they appreciate homes made really homelike by the addition of those fragrant and beautiful things which childhood memories recall to the minds of so many of them.

That the ideals of life, and love of the lovely, are advancing in Canada is abundantly evidenced by the increasing number of inquiries which come to the Central Experimental Farm regarding all phases of this work. Advice is sought on subjects which a few years ago occupied the attention of very few people in this country. In order to be able to give this advice, the activities in connection with the work of ornamental gardening have rapidly extended during the past few years.

NOTES ON NEW WORK, ETC.

CLIMBING PLANTS AND ROCK PLANTS.

Owing, as has been already stated, to the fact that inquiries are reaching the Central Farm with regard to certain groups of plants, very few of which have been grown up to the present, measures were taken this year to test systematically rock and climbing plants.

A pergola was built in the autumn of 1913, in order to provide accommodation for a fairly full collection of hardy climbing vines, including roses. Many of the climbing roses were planted two years ago, and should they come through the winter of 1913-14, as expected, will receive material advantages from the support and influence of this structure. The woody climbers, including all the best native climbers, were planted in the autumn of 1913.

Accommodation has also been provided under the pergola for a collection of rock plants, ferns, etc., and many rock-loving plants were planted in the autumn. The pergola is 175 feet long by 12 feet wide inside. A grass walk 5 feet wide is carried down the centre, and each side of this walk is arranged in order to accommodate the rock loving plants, etc. Two permanent vines are planted at nearly all of the main posts. Between the posts, provision will be made to test annual climbers, etc.

TWO BEAUTIFUL LITTLE PLANTS.

Two very satisfactory rock-loving plants which may be highly recommended to those interested in such plants, are: The Rock Cress, the double flowered variety, especially (*Arabis albida*), and the Moss Pink (*Phlox subulata*), the latter to be had in several colours. Both plants are quite hardy and spread very quickly. Early in the spring, especially where they have been left to grow undisturbed for a few years, they form perfect carpet-like masses of bloom. The Rock Cress is pure white, and the Moss Pink, various shades of pink and lavender. Both have done exceedingly well at Ottawa.

ROSES.

The present rose garden at the Central Farm was started in 1911. Up till that year roses had been grown in beds on the main lawn. Amongst them, however, were very few of the new popular Hybrid Tea roses.

In 1911 the first large collection of Hybrid Tea roses was placed under test at the Farm. This first collection consisted of about one hundred varieties of the newer roses.

Since then, several collections have been added, the object being to have at the Central Farm, under systematic trial, all the best and newer Hybrid Tea roses.

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The rose garden also contains good collections of the best of the Hybrid Perpetual, Hybrid Japanese, climbing, the new class of roses known as Austrian Hybrids or Pernetiana, and the Polyantha Pompon or dwarf bedding roses.

The Japanese roses, Moss roses and a few other hardy types, do not receive winter protection since they are quite hardy and do not suffer from winter killing. All other roses, with the exception of a few beds left unprotected for test purposes, are regularly protected during each winter.

A small collection of Tea roses planted in the spring of 1912, winter-killed during the winter of 1912-13, with the exception of one variety, namely, "Blumenschmidt."

Very few of any of the other classes of roses were winter-killed. A number of the Hybrid Teas, however, succumbed to the heat and dry conditions of the past summer of 1913.

Notes on the following points have been taken so far on roses under trial:—

1. On the vigour and blooming capacities of the plant.
2. On the beauty, colour, fragrance, etc., of the flower.
3. On the freedom of each variety from leaf spot and rust.
4. On the tendencies to continuous and late-blooming habits.
5. On the effects of various spray mixtures and culture practices.

The pamphlet on roses gives further particulars as to varieties, etc.

LARGE GROUPS OF POPULAR FLOWERS.

What are known as "flower groups" have held for some years an important place in the test plots at the Central Farm. Each of such groups is represented by many, if not all, of the best varieties of a particular flower.

At the present, these groups cover about a dozen different kinds of flowers, sweet peas being one group, irises another, phlox another, and so on.

In 1913, the sweet pea group consisted of 185 varieties, grown for the sake of a varietal test of these popular flowers.

Varieties tested in the other groups in the summer of 1913 were as follows:—

Cannas	60	varieties
China Asters	90	"
Dahlias	56	"
Geraniums	124	"
Gladioli	300	"
Irises (German) about	180	"
Paeonies, about	135	"
Perennial phloxes, about	90	"

In addition to the above, smaller groups of annual flowers, including annual chrysanthemums, coreopsis, zinnias, etc.

At present the work has not been complete enough with any one of these groups to record it in detail, as the problems presented in making observations on these groups are considerable. Chiefly perhaps on account of the large number of varieties in each group, which are practically identical in every regard except the name under which they are offered to the public by those offering them for distribution.

PERENNIAL FLOWERS.

A very widespread interest has taken place of late years in one of the most important groups of flowers, namely, herbaceous perennials. On account of their usefulness, ease of culture and many other good qualities, they have been eulogized as being, in a large measure, responsible for the increased interest in home beautification.

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The bulletin on "Herbaceous Perennials," published in 1908, gives a great deal of information about these plants. It reports on the merits, dates of flowering, and colours of over 2,000 species and varieties.

In the autumn of 1911 a special border, 12 feet wide and 450 feet long was planted with about 600 species and varieties consisting of the best from among the larger number previously tested. This border was prepared in order that the best perennials, and those most suited to Canadian conditions, might be grown in positions where they are easily accessible to the large number of people who are interested in these flowers, and desire to make personal observations regarding them.

By growing them in this way, an opportunity is also afforded of making many interesting observations on the suitability of the various plants for specific purposes. In addition to this, the border also makes a very interesting ornamental feature at the Central Farm.

The border presents a good display of colour from the early spring, when the several thousand bulbs radiate colours as wonderful and varied as those of the rainbow, until quite late autumn, when the perennial asters, in their brilliant hues, reluctantly give place to the snow mantle of winter.

Seasons of Bloom of the Best Perennial Flowers.

For the information of those who wish to grow more of these satisfactory flowers, and who have room for a limited number only, and therefore wish for plants which will produce effects, and give bloom at some particular season of the year, the following brief notes are given:—

For Early Spring Bloom (Month of May at Ottawa).—Bulbous flowers such as: Snowdrops, crocus, squills, narcissi, tulips, etc.; also the following flowers easily raised from seed: Virginian cowslip, bleeding heart, moss pinks, epimedium, forget-me-nots, spring anemones, and pansies.

For Spring Bloom (Last of May and Early June, at Ottawa).—The large German iris group, followed by the larger pæonia groups. Also the following: Oriental poppies, columbines, sweet rocket, late and Darwin tulips, late narcissi, perennial candytuft, day lilies, eremurus, globe flower, spider-wort, hairbell, Iceland poppies, etc.

For Early Summer Bloom (June and into July, at Ottawa).—Bellflowers, foxgloves, pentstemons, sweet williams, hardy lilies, perennial larkspurs or delphiniums, coral bells, lupines, corcopsis, perennial pinks, gas plant, speedwells, pyrethrums, Iceland poppies, Japanese iris, etc.

For Late Summer Bloom (Last half of July and August, at Ottawa).—Perennial phloxes, a large group of beautiful flowers, hollyhocks, sunflowers, baby's breath, bush clematis, blanket flower, cone flower, Chinese bell flower, Shasta daisy, incarvillea, rudbeckia, etc.

For Autumn Bloom (Late August and September, at Ottawa).—Perennial asters, a beautiful coloured group of native and European plants, sunflowers, Japanese lilies, rose-mallows, sea-lavender, monkshood, heliopsis, gladioli, heleniums, etc.

RECENT DONATIONS OF ORNAMENTAL PLANTS.

From time to time donations of new varieties of trees, shrubs, or seeds of rare plants are received by the Central Farm from botanic gardens, etc., in other countries of the world.

In 1912 three such institutions sent donations of trees and shrubs to the Central Farm at Ottawa. These institutions were:—

The Botanical Gardens, Glasnevin, Ireland.

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The Royal Botanic Gardens, Kew, England.

The Arnold Arboretum of Harvard University, Boston, U.S.A.

The material reached Ottawa in November, and was planted out immediately. Most of the plants came through the winter safely and made satisfactory growth during the season of 1913.

Among several interesting new species and varieties sent from the Arnold Arboretum, there was included a specimen of that rare and unique tree, discovered in China by E. H. Wilson some years ago, called *Davidia involucrata*. This tree has a very interesting history and is classed as one of the most beautiful of all the rare flowering plants.

Nearly all of the shrubs in this collection were specimens of a few of the newer shrubs collected by this renowned collector, now in the employ of the United States Department of Agriculture. Mr. Wilson's introductions number several thousand, many of which are likely to be popular additions to our exotic ornamentals. It is an advantage to have some specimens of these desirable plants from a first-hand source.

PROMISING SHRUBS RECENTLY IMPORTED.

Amongst the new varieties of shrubs imported from Europe during the past few years are several new varieties of that very graceful shrub "The Tamarisk" (*Tamarix*). Last year some of these varieties went through the winter better than others. A hardy variety would certainly prove very acceptable, as this shrub is unique and could be used to great advantage. It is striking and beautiful when in bloom in July and August.

NOTES ON ANNUAL FLOWERS.

For several years past considerable varietal test work has been carried on with annual flowers, and during the past year some experimental work was commenced in connection with these flowers.

During the summer of 1913, 315 different varieties or selected strains of annuals were grown in the test plots at the Central Farm.

In the following lists a number of the best of these is described. It seems desirable to outline the strong points which are claimed for annual flowers. It is not intended by so doing to suggest that they are competitors for popular favour with the perennial flowers, for both types are necessary in our gardens. The purpose is more to indicate how easy it is to get flowers to brighten all parts of the country in an almost incredible short space of time and at a minimum of labour and outlay.

1. Annuals, perhaps more than any other group of flowers, exhibit a wonderful diversity of form and colour by means of which bold and beautiful effects may be produced.

2. By using annuals these effects may be produced in the short space of two or three months from the time the seed is sown. Annuals have no rivals in this respect. The bare earth is transformed into a fairy-land of beauty in twelve short weeks.

3. On account of their various habits it is possible to use annuals for all sorts of purposes, such as: screens for ugly fences, plants to cover rocks, flowers for beds and borders, etc.

4. As flowers for cutting, some of the annuals are unequalled, to mention only the sweet peas and asters is a proof. No cottage need be without flowers.

5. Annuals as a group possess a large number of fragrant flowers, for instance: Ten-week stocks, sweet peas, mignonette, candytuft, petunias, etc.

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6. Annuals are not too particular as to soil, and although appreciating good soil, some varieties may be found which will do well in almost any soil.

Finally, in adding a word as to their culture, it should be said that it pays to buy good seed. Do not sow the seed too thickly or too thinly, neither in ground too dry nor in ground too wet. Avoid sowing the seed so early that spring frosts overtake the young plants. And, lastly, let the plants have plenty of room after they are thinned out for the last time or when they are planted out to their permanent quarters, if raised from seed sown indoors.

SOME OF THE BEST LOW-GROWING ANNUAL FLOWERS.

California Poppies (Eschscholtzia).—Brilliant golden yellow or orange-coloured flowers; new varieties in other colours. Sow the seed where the plants are to grow. Do best in a warm sunny position.

Candytuft (Iberis).—The new Hyacinth-flowered and Rocket strains are very satisfactory. To be had in white and various colours. Sow seed where they are to grow and thin out the plants from 6 to 9 inches apart.

Mignonette (Reseda).—Should be in every garden on account of its fragrance. Many new varieties differing considerably in habits. Dislikes some soils.

Pansies (Viola).—Modern pansies are obtainable in gorgeously rich colours. A good practice is to sow the seed in late July and protect the plants during the winter. Fine flowers are thus obtainable for early spring.

Petunias (Petunia).—Petunias make rapid growth. In order to keep them in bloom all summer, and the plants neat-looking, pinch back the plants occasionally. The new fringed varieties are improvements on the old types.

Portulaca (Portulaca).—Does best when given the hottest site in the garden. Do not sow the seed till the last week in May. It loves a fine sandy type of soil.

Pinks, Annual (Dianthus).—The Chinese pinks and the India pinks are delightful because of the rich beauty of their flowers. Sow the seed early. They like the sun.

Phlox Drummond's (Phlox Drummondii).—A splendid plant for richness and range of colour. Easy to raise. The medium height varieties are the best.

Verbenas (Verbena).—Its free flowering and spreading habit gives it a useful place. One of the last plants to succumb to autumn frosts.

SOME OF THE BEST ANNUAL FLOWERS OF MEDIUM HEIGHT.

Acroclinium or Everlastings (Acroclinium).—This pretty little "Everlasting Flower" should be much better known. It is pretty in the border and very satisfactory when dried for winter boquets.

Balsams (Impatiens Balsamina).—Balsams are rapid-growing plants and always popular. Their one drawback is they are very tender to frost. Grow in good soil. Camellia-flowered varieties are the best.

China Asters (Callistephus).—For cutting purposes the asters are held in high esteem. Modern varieties of the Ostrich Plume and Victoria types are as fine as some chrysanthemums. No garden in town or country should be without asters.

Coreopsis (Coreopsis).—The two species of coreopsis, namely, *C. Drummondii* and *C. tinctoria*, with their many pleasing colour variations, are fine additions to our gardens. Useful also for filling the vases indoors.

Clarkias (Clarkia).—The double varieties are dainty and beautiful. Some of the colours are particularly rich.

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Gaillardia, Annual (Gaillardia).—Annual Gaillardia is not so appropriately called "Blanket Flowers" as the perennial form. In a good warm summer they do very well and are very useful for cutting. They need a long season.

Godetias (Godetia).—Godetias produce strikingly pleasing colour effects in the garden. They are beautiful flowers, deservedly popular.

Larkspurs, Annual (Delphinium).—The tall varieties of the annual larkspurs are the best. They last longer and their tall spikes show up to splendid advantage.

Love-in-a-Mist (Nigella).—This old-fashioned flower has its quaintness in its favour. A three-hundred-year-old flower is worthy of a place in the flower garden.

Marigolds (Tagetes).—The "African" and "French" marigolds are very similar in many ways. Both are quick-growing and free-flowering, with flowers in shades of yellow, orange, with maroon markings. They like the heat.

Marigold, Pot (Calendula).—These have flowers which many prefer to those of the ordinary marigold. The plant is of another type although the flowers resemble those of Tagetes. Stands considerable frost.

Nemesias (Nemesia)—These are flowers with a modern popularity. The colours are bright and attractive and the plants very neat in appearance.

Pin-Cushion Flower (Scabiosa).—Its popular name well describes this flower. Most useful for cutting. They like good soil and plenty of room. Flowers of various colours, with a velvety appearance.

Poppies (Papaver).—There are several new varieties of annual poppies which are worth growing. The Shirley poppies are, however, deservedly most popular.

Stocks, Ten-Weeks (Stock).—If they had no fragrancy, these bright coloured flowers would still be popular, but being so richly fragrant they are great favourites in the garden.

Scarlet Sage (Salvia).—The best of all the scarlet flowers. Should have a good background to show it up by way of contrast. Sow seed early.

Snap-Dragons (Antirrhinums).—Very popular flowers in a great range of bright and glowing colours.

Sweet Sultans (Centaurea).—Another useful flower for indoor decoration. New varieties have larger flowers and longer stalks.

Zinnias (Zinnia).—A popular flower sometimes known as "Youth and Old Age." Well-grown plants will produce very large flowers. They are often used as cut flowers, but are rather formal in appearance. They like a sunny position.

SOME OF THE BEST TALL-GROWING ANNUALS.

Cosmos (Cosmos).—A graceful and attractive plant with feathery foliage. For the list of the newer varieties see "Notes on New and Little-known Plants."

Everlastings (Helichrysums).—These popular "Everlastings" are the largest and the most showy for winter decorations. They should be cut for drying when not more than half open. To be had in five or six colours.

Larkspurs, Annual (Delphiniums).—The tall varieties should be grown in preference to the others. See note in previous list. White, deep blue, and orange scarlet are good colours.

Painted Tube-Tongue (Salpiglossis).—When grown under favourable conditions this is one of the most beautiful of all annuals. Colours varied and exceedingly rich and pleasing.

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Sunflowers (Helianthus).—Some of the newer varieties can be recommended as superior types.

Tobacco Plant (Nicotiana).—This well-known fragrant flower is well worth growing. The coloured variety looks well mixed with the white variety. It will open best in the evening and on dull days.

SOME OF THE BEST CLIMBING ANNUALS.

Morning Glories (Ipomoea).—The Japanese morning glories are the best, the flowers being larger and of many rich colours.

Nasturtiums, Climbing (Tropaeolum).—The many good climbing varieties should have a fairly rich soil in order to do well.

Sweet Peas (Lathyrus).—Too well known to need comment. The Spencer varieties are the best.

NEW AND LITTLE-KNOWN ANNUALS TESTED AT OTTAWA, SUMMER, 1913.

Amongst the twenty "New or Little-known" annual flowers favourably reported on below, only a few are even fairly well known, while most of them are very seldom heard of in Canada. Most of them should be welcomed by flower lovers.

(The seed of all the annuals was sown in hotbeds April 11 to 14, and the plants were put into their permanent positions the first week of June.)

Arnebia cornuta (Prophet Flower).—Plants spreading, 12 inches to 18 inches high, covered with a mass of yellow bloom, each flower having five black spots which fade to light brown and then, after a few days, disappear entirely. A native of northwest India. Useful for sunny situations and rock gardens. In bloom from July 2 till late September.

Bartonia aurea (Barton's Golden Flower).—This is more correctly classified as *Mentzelia Lindleyi.*—Plants spreading 18 inches high, single flowers 1½ inches across, a rich golden yellow, opening more freely towards the evening. Does well in the sun. Useful for the border or rock gardens. In bloom from July 10 till end of August.

Centranthus macrosiphon.—Plants upright or slightly spreading, 18 inches high, flowers small rosy-red, borne in Valerian-like masses. A Spanish annual standing the heat well. Useful for a border or rock garden. In bloom from June 4 till late September.

Centaurea imperialis (Sweet Sultan).—Plants 24 inches to 30 inches high. Flowers of various colours, 2 inches to 3 inches across, on long stems. Great improvement on the older Sweet Sultans. Splendid for cutting. In bloom from July 3 till early September.

Cacalia coccinea (Tassel Flower).—Plants upright, 18 inches high. Small flowerheads of vivid orange scarlet, borne on long stems. Fairly useful for cutting and also for borders, on account of vivid colours. In bloom from June 14 till middle of August.

Cosmos or Cosmea (Cosmos).—Plants 3 feet high.—The cosmos is a Mexican plant allied to the dahlia. Its finely divided feathery foliage is very pleasing. This particular variety called Dobbie's New Early Flowering, is excellent in that it is in bloom six weeks to two months earlier than other varieties. Useful for special locations and the back of border. Flowers various colours. In bloom from June 26 till late September.

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Jacobaea (Senecio or Groundsel).—Plants 12 inches high, foliage thick and fleshy, not affected by the heat. Flowers borne in dense heads, double, various colours. Useful for bedding or the rock garden. In bloom July 27 till early October.

Lupinus (Lupine).—Plants 18 inches high, upright, flowers in spikes, various colours. Sun-loving plants doing well in soil where lime is plentiful. Useful for the flower garden or border. In bloom from July 3 till August.

Linum grandiflorum (Flax).—Plants 12 inches high. Flowers bell-shaped, rich scarlet crimson. Effective on account of its rich colour. Useful garden plant. In bloom July 15 till end of September.

Leptosyne Stillmanii.—Plants 12 inches high. Closely related to the coreopsis. Yellow flowers on fairly long stems. Useful for cutting. This variety is of recent introduction. California plant, liking a sunny situation. In bloom from June 27 till late September.

Leptosiphon hybrids.—Plants 6 inches high. Flowers small, neat, attractive, and of various colours. These dwarf hybrids are likely to be very useful for edging and rock-work. In bloom from July 6 till end of August.

Lavatera rosco splendens (Mallow).—Plants 18 inches to 24 inches high. Flowers a pretty shade of rose pink. The Lavateras are effective plants with their beautiful cup-shaped flowers. Useful in the garden or border. In bloom from July 25 till middle October.

Martynia fragrans (Elephant's Trunk).—Plants very spreading, 12 inches high, large woolly leaves. Flowers fragrant, gloxinia-like, of mauve and purple. Likes a moist and sunny position. Useful when a bold foliage plant is needed. In bloom from July 10 till middle September.

Oxalis (Cloth of Gold).—Plants 9 inches high, resembling the clover plant. Flowers yellow, rather small. Does well in warm sandy soil. In bloom from July 2 till early September.

Rudbeckia Golden Sunset (Coneflower).—Plants 18 inches high, flowers yellow with chestnut markings. A compact, attractive plant, bearing a great profusion of bloom. Useful for cutting. In bloom from July 3 till late September.

Sphenogyne speciosa.—Plants 12 inches high. Flowers Marguerite-like yellow with brownish centre, lasting only for a short season, otherwise attractive. In bloom from July 8 till middle August.

Statice, Annual (Sea Lavender).—Plants 24 inches high. Flowers in spikes or sprays, everlasting, small, bell-shaped; colours, cream and purple. Useful for cutting and may be dried as ordinary everlasting flowers. Does well in light soil. In bloom from July 15 till middle October.

Tagetes Golden Gem (Dwarf Marigold).—Plants 9 inches high. Flowers small orange-yellow, growing in great profusion over the entire plant. Stands drought well and blooms best in rather light soil. Useful for edging or bedding. In bloom July 19 till late September.

Viscaria cardinalis (Rose of Heaven).—Plants 18 inches high. Profuse blooming annual, pleasing, brilliant crimson cup-shaped flowers. A fine garden or border flower. Similar to Lychnis. In bloom July 14 till early September.

Whitlavia grandiflora (Whitlavia).—Plants 12 inches high, related to Nemophila and sometimes classed with Phacelia. Flowers bell-shaped, deep blue, attractive in early summer, but do not last long. Useful in flower garden. In bloom June 16 till middle August.

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SELECTED STRAINS OR NEW VARIETIES OF WELL-KNOWN ANNUALS.

In addition to the foregoing, a few new varieties or selected strains of certain well-known annuals put on the market during the year 1913 as novelties, by various seed firms, should be mentioned. In very few instances, however, were these novelties superior to the older varieties.

Alonsoa gracilis (Mask Flower).—One of the best of the Alonsoas.

*Cyanus minor (*Corn Flower*).*—Very free flowering.

Cyanus major (Corn Flower).—Mixed shades of blue, free flowering.

Celosia cristata (Cockscomb).—Scarlet, a neat dwarf variety.

Clarkia elegans.—Double coppery red, attractive colour.

Chrysanthemum inodorum (Bridal Robe).—Very free flowering.

Dimorphotheca aurantiaca hybrids (Cape Daisy).—Some pleasing colours.

Eschscholtzia Thorburnia (California Poppy).—Deep orange yellow.

Linaria reticulata aurea (Toadflax).—A pleasing free bloomer.

Morning Glory (New Airy Fairy).—Colour not attractive.

Petunia, Large-flowered, Fringed.—A very good strain.

UNSATISFACTORY NEW PLANTS.

The following "New or Little-known Annuals" did not show up to advantage this year. No adverse criticism, however, will be made until they have been tested further:—

Collinsia bicolor (Collin's Flower).

Campanula attica (Bell Flower).

Calindrinia speciosa (Rock Purslane).

Gypsophila elegans compacta (Chalk Plant).

Hebenstreitia comosa.

Kaulfussia amelloides (Cape Aster).

Limmanthes Douglasii.

Leptosyne maritima.

Schizopetalon Walkeri.

THE MAKING AND CARE OF LAWNS.

The first experiments at the Central Farm with grasses for lawn purposes were made some twenty-five years ago. In Bulletin No. 19 of the Central Experimental Farm, published in 1893, Dr. Fletcher, who was at that time botanist, reports some interesting results in connection with types suitable for lawns under trial at that date. Since then many experiments with various objects in view have been carried on. The many adverse conditions which have often prevailed at Ottawa, both in regard to soil and season, have offered ample opportunity to test out the merits of grasses and mixtures recommended for lawn purposes.

The points taken up in the following article with regard to types of soil, time to sow, nurse crops, etc., are points, advice about which is given not only on accepted principles of good practice prevailing elsewhere, but also on the finding of many years of work with regard to such methods at Ottawa. The making of the main lawn at Ottawa, in fact, was a practical problem founded on no small handicap. The soil

in some places was nothing less than a sand-knoll of the poorest type. The same lawn at the present time offers many interesting problems in the maintainance of an old lawn, the trial of the weed-killers now extensively advertised, the restoration of areas winter-killed through the formation of ice, the effects of commercial fertilizers, the effect of top-dressing with stable manure, etc. Although much information has been obtained with regard to some of these points, the experiments now under way will, it is hoped, supply much more needed information. Practical ways of watering lawns economically and efficiently are also being investigated.

The question then so frequently asked by many correspondents of the Experimental Farm as to what is the best way to make a good lawn, is a very important question.

The lawn is our outdoor carpet, and a very beautiful carpet it is, and upon it in suitable positions are to be placed the garden furnishings, in the shape of shrubs, trees, etc., which are to remain as fixed furniture for many years.

A lawn, then, if for this reason alone, should be well made, but another equally important reason for starting the lawn correctly, is that a good velvety lawn is more delightful to walk upon than anything else, whereas, a poor-looking lawn is an eyesore and a source of constant trouble.

Lawn grasses are so classed because of a peculiar habit of growth which separates them from among hundreds of other varieties. Often, however, these other varieties get into lawns and cause trouble by producing patchy effects, due to a difference in the habit of their growth. Burnt-looking patches, in dry spells, are often due to their presence, although such patches may be the result of an uneven type of soil or uneven water supply. This being the case suggests that in order to make a good lawn, the first consideration is that of the two important factors of soil and seed.

SOIL AND ITS PREPARATION.

The soil for a good lawn, in respect of its quality, is not of vast importance. A very poor piece of land, if properly prepared, will in a few years support a good lawn. Soils, of course, are of many types, but it may be best here to consider all soils as belonging to one of three classes. These classes are: (1) heavy or clayey soils; (2) medium loamy soils; and (3) light sandy soils. Soils belonging to the first and third classes need more preparation than soils of the second class, that is, medium loamy soils.

Soils of the first type, namely, heavy clay soils, should be first of all drained, if possible. Drainage to a heavy soil is like fresh air to a stuffy room. The oxygen in the fresh air as it passes down through the soil, has exactly the same results on the plant growth, as fresh air has on the human system. Oxygen or air is enabled to pass through a drained soil more freely than through an undrained soil, because the water in passing down to the drains below, leave channels through which air is sucked. In many cases where drainage is not given, sickly growth or bad winter-killing of the grasses results.

Soils belonging to the second class, that is, medium loam soils, are the best soils for lawns, and need little improvement before sowing the seed.

Soils belonging to the third class, or sandy soils, are also fairly good soils for lawns, when it is possible to add enough vegetable matter or barnyard manure to supply plant food for several years. Such soils, however, dry out very quickly, and the grasses are more liable to be injured by drought. Where good soil is procurable, it is safer to apply a top dressing, to such soils, of about 6 inches of good loam.

GRADING, LEVELLING AND SPECIAL PREPARATION.

It may sometimes happen that the plot to be sown to lawn is very uneven in character. In such a case it has to be graded or levelled.

In the act of levelling, care should be taken to take off the top layer of soil and keep it by itself, ready to apply as a top dressing all over the freshly-graded parts

after the work of levelling is finished. Plants will seldom grow in the raw sub-soil. The top soil being the richer in plant food should always be kept at the surface. In filling up holes, be careful to see that the soil is well packed into them, or subsequently settling takes place and an uneven lawn is the result.

BEST GRADES FOR THE LAWN.

The best grade for a town lawn is to have it slope slightly away from the house and towards the street. This prevents surface water from remaining on it after heavy showers and also gives the appearance of greater size to the lot. The levelling should be done as perfectly as possible before the seed is sown. Hand rakes are the best tools to accomplish this, and all stones, except those which are very small, should be raked off.

When the soil is not of the very best quality, good large applications of farmyard manure, in a well-rotted condition, should be made just previous to the final preparation. Unless the manure is exceedingly well rotted, it may be best to apply it several months previously. One of the best of the commercial fertilizers is fine steamed bone meal. A "complete fertilizer," consisting of potash salts, superphosphates, and a little nitrate of soda, also gives satisfactory results. Such fertilizers may be applied at the rate of from 250 to 500 pounds per acre, or about one ounce to a square yard of lawn. Commercial fertilizers should not be applied during dry weather. Two or three applications during the course of the season, applied at the above rate, will generally give better results than a much larger quantity applied all at once.

HOW AND WHEN TO SOW THE SEED.

The seed should be sown when there is no wind, because the seed, being very light, is difficult to distribute evenly in windy weather. To ensure even distribution, it is best to mark off the lawn into strips about 6 feet wide, and sow fairly lightly. Then mark it off again at right angles to the first strips, and sow a second time.

Seed is best sown during one of the three following seasons: First, as early in the spring as possible, that is, as soon as the ground is dry enough to work. If the ground has been prepared the previous autumn, so that all that remains to be done in the spring is to sow it to seed, the spring is perhaps the most satisfactory time to sow. The second season is during the latter part of August or early in September. Should delays hinder the early spring sowing, it is generally better to put off sowing till this season. The reasons for this are that during the months of June and July, the seed fails to germinate, or if it germinates, the long hours of sunlight and the dry atmosphere kills off the tiny plants, whereas by September, by the aid of dew and rain, the seed germinates quickly and survives the heat of the sun far better. The third season is as late in the autumn as possible—just before the ground freezes up. The object of sowing the seed at this season is to gain time in the spring. The seed will lie in the ground without harm during the winter, and will germinate very early in the spring. It must not be sown too early in the autumn, otherwise it may germinate and the young plants being quite tender at the start of their life, most of them will be killed off by frost. After the seed has been sown, the soil should be carefully and not too heavily raked and, with most types of soil, a final rolling will prove beneficial.

KINDS AND QUANTITY OF SEED.

From the vicinity of New York northward, the best lawn grass mixture is one consisting of Kentucky Blue grass, and a small quantity of White Dutch clover. In some cases Red Top is mixed with the Blue grass. Seed firms selling special lawn grass mixtures, generally add to these grasses some such quick germinating grass as

timothy or English Rye grass. Such grasses are for temporary purposes only. The reason for this is that the permanent lawn grasses take several years to get well established, but when they do finally take possession of the ground, the best of results continue for years. Where the lawn is made for the purpose of tennis or croquet, it is best to omit the clover, as this takes longer to dry out after a shower and is slightly slippery. Seed should be sown at the rate of 4 to 6 bushels per acre, according to the soil, season and mixture. Kentucky Blue grass, 5 bushels, White Dutch clover, 1 or 2 pounds, with 1 bushel of Timothy or English rye added for results the first season, is an excellent mixture. All reliable seed firms sell excellent mixtures which often give good results, but Kentucky Blue grass alone or with White Dutch clover is recommended. A piece of lawn the size of a tennis-court requires nearly a bushel of seed, or a piece 50 by 100 feet, three pecks. Grass seed is generally sold by weight, one bushel of Blue grass weighing 14 pounds.

Sometimes what is known as "a nurse crop" is sown with the lawn grasses. This generally consists of either oats or barley, and is used in order to give shade and protection to the tenderer grasses. A "nurse crop" is useful when a lawn has to be sown late in the spring. If used, it should be cut when not more than 6 inches high, and will require about three cuttings during the season.

CARE OF A NEW LAWN.

A new lawn should not be left to grow as it pleases during the first year, as is sometimes supposed. The first cutting should take place when the grass is about 4 or 5 inches high, and a new lawn sown late the previous autumn or in the early spring should be cut four or five times during the first season. The grass is improved thereby and weeds which are bound to come up freely in new lawns are also kept in check. After the first season, most weeds will disappear, but should dandelions or plantains make their appearance, nothing less than cutting out each plant with a "spud," or pulling it up by the roots, will be effectual in keeping them in check. All other weeds, with a few exceptions, have a less persistent root system, and cannot survive one or two cuttings with the lawn mower. A good sharp scythe may be used to cut the lawn for the first few times, although a lawn mower in good condition is perfectly satisfactory, and will not pull up the grass by the roots.

WATERING AND GENERAL TREATMENT.

Should it be necessary to water the lawn, it must be well soaked at each application. Sprinkling a lawn is very bad practice, as the water does not get deep enough into the soil to reach the roots, and instead of benefiting, it causes the surface to bake in the form of a crust, which is fatal to healthy growth. Moreover, owing to the law of capillarity, far more water is lost by evaporation the next day than was added by the sprinkling.

Young lawns, and even well-established lawns, are always improved by a good rolling in the spring. Should there be any holes in the lawn, they may be filled up at this time by adding some good loam. The grass will quickly push up through soil thus added. Where leaves and other waste materials have accumulated on the lawn during the winter, such should be raked off in the early days of spring. Thorough raking will also improve the grass.

Another point to remember is, that a delay in cutting the lawn in the spring always makes the first cutting much harder work, and sometimes produces injury to the grass as well; therefore, get the lawn mower into shape during the winter, and out on the lawn as soon as it is green in the spring.

In addition to the foregoing information relating to the making and care of an ordinary lawn, the Central Farm is frequently applied to for information regarding points referred to below:—

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BEST GRASSES FOR SHADY PLACES.

In all cases it is advisable to sow some of the seed of Kentucky Blue grass recommended for ordinary lawns, or Canadian Blue grass (*Poa compressa*) together with either Various-leaved Fescue (*Festuca heterophylla*) or Rough-stalked Meadow grass (*Poa trivialis*). One or both of the last with one of the blue grasses will make a good mixture for shady spots when the land is damp and inclined to be cold. Red Top is another good grass for moist lands.

In shady spots where the soil is dryer, this mixture is perhaps better, namely, Kentucky Blue or Canadian Blue grass with either the Crested Dog's-tail grass (*Cynosurus cristatus*), or Wood Meadow grass (*Poa nemoralis*). Red and Sheep's Fescue will also thrive on drier soils.

If it is desired to have immediate effects, it will be necessary to add to whichever mixture is used, one of the quick germinating grasses, such as English Rye grass, timothy, or low spear grass (*Poa annua*).

WEEDS IN LAWNS.

For getting rid of weeds in lawns, where they are apt to occur in abundance, many spray methods have been tried. The question of "weeds" has been reported on by another Division of the Farm, and the only thing that need be said here is that the two weeds previously mentioned, namely, dandelions and plantains, which very commonly occur in lawns, almost defy all methods of eradication other than that which is generally recommended, namely, spudding or cutting out by hand. Of spray mixtures, sulphate of iron has been found by some to be effectual. In one instance it was found that a 25 per cent solution applied six times at intervals of two weeks killed out all the dandelions; the plantains, however, were not killed by it. The area of grass sprayed was entirely free from dandelions the following spring, and was rather greener in colour. It showed up in marked contrast to the surrounding areas where dandelions were growing in great abundance.

Other weeds, sometimes troublesome in lawns, are the thyme-leaved speedwell (*Veronica serphyllifolia*), mouse-eared hawkweed (*Hieracium pilosella*), and sometimes one of the wiry grasses such as *Festuca ovina*.

HIGHLY-COLOURED AND EASILY GROWN POPULAR FLOWERS.

THE OUT-DOOR CULTURE OF BULBS.

Of the many great groups of flowers which are widely separated from each other by habits of growth or seasons of bloom, none has been more thoroughly tested at Ottawa than that group of popular spring bedding plants known as bulbs. Whether it has been to find out the best varieties for bedding, or the best combination of colours in the beds, or the best methods of growing them, the number and extent of the trials have been large and have been extended over almost twenty-five years. Many splendid additions have been made to these easily grown and wonderfully coloured flowers during that period. Perhaps none has been as remarkable and calculated to give a permanent popularity to these flowers as that of the magnificent Darwin tulips which have been added to their ranks during the past few years.

For many years, as stated, the older types have occupied permanent positions in the lawn beds at the Central Experimental Farm. The Darwin tulips, however, during the last few years, owing to their colour, height and beauty of form, have dominated

the situation in the latter half of the month of May. That is, it has been found that the blooming season of the tulips has been considerably lengthened by the addition of this section. The experiments now being conducted, and which are a continuation of work along similar lines in the past in connection with these flowers, aim to obtain information along the following lines: The hardiness of the bulbs, the length of the blooming season, display effect, usefulness as border plants when left growing in the same place for several years, summer treatment of the bulbs, etc.

When all the merits of this group of flowers are considered, it is not to be wondered at that of the hundreds of thousands of bulbs grown in Canada, millions in the United States, and tens of millions in Europe, many thousands of them in many parts and colours may be found growing at the Central Experimental Farm at Ottawa. In the autumn of every year they are planted to make, in the following spring, what is perhaps one of the most gorgeous displays of colour that it is possible to create. Each year the various types of bulbs are becoming more popular in Canada, and frequent inquiries are received at the Central Farm regarding their culture.

When the word "bulb" is mentioned, there immediately comes to the mind, masses of gay tulips in beds and borders, and patches of white and golden narcissi in lawn and woodland. The range and brightness of the colours of the tulip are not equalled perhaps in the whole of the floral year. After the long, colourless winter, they appeal to man's primal love of rich colours, in a degree seldom equalled by the beautiful flowers of later seasons.

Under bulbs may be classed about fifty to sixty different genera of plants, but of this number, the tulip and narcissi rank first and second, with perhaps lilies, crocuses, snowdrops and glalioli following fairly closely, while hyacinths, freesias, blue-bells and glory-of-the-snow find greater welcome, as worthy companions of these favourites every year.

EASY TO GROW.

The fact that some of our finest flowers are to be found amongst these bulbous plants is apparent to even a novice in the art of floriculture. And it is encouraging to an amateur gardener to know that most bulbs are very easy to grow successfully. This is due to the fact that when a good grade of bulb is bought, a good plant is practically assured. The size and quality of the bulb determine the resulting flower, and the only skill, if such it may be called, that is required by the grower is to put it into a medium in which it may develop its enclosed flower or flowers. No amount of care or high culture will add more spikes of bloom to a hyacinth, or flowers to a daffodil, than were formed when the bulb was growing the previous spring in Holland. Holland is the country where most of them are grown, and consequently, they are often called "Dutch bulbs."

REQUIREMENTS OF THE BULB.

Given then, a good bulb, what has to be done in order to get it to develop into a good plant? Its requirements in regard to soil, moisture, and manure, are of the simplest kind.

First, as to soil, all bulbs generally do best and most varieties require a soil through which water can pass with reasonable freedom, or, in other words, the soil should not remain soggy, as such soil will suffocate the plant. If the soil is soggy, it must be drained and some sand and coarse manure added to it.

Second, as to moisture, most bulbs require plenty of water, and hardly too much can be given when the soil is of the right texture; this is especially true with regard to the period just before blooming. If the soil is right in texture, the water in passing

through it, leaves channels through which air is supplied to the roots, and that is why the soil should be well drained and not soggy.

Third, with regard to manure. The directions in this connection must be combined with a warning. Bulbs should not have any manure at all, unless planted in a border in which they are to remain for several years. In supplying manure, in such cases, it must be trenched in, and must not on any acount, come in contact with the bulbs. It is a good practice to apply the manure a year previous to the planting of the bulbs, in order that it may become thoroughly mixed with the soil, and almost entirely decayed.

TIME TO PLANT.

Most of the spring-flowering bulbs must be planted in the autumn. In places where the ground does not freeze up till late, planting may be continued till November, but the earlier they are planted the more time they have to make root growth in the autumn, and as a consequence, larger and better flowers may be looked for in the spring.

HOW TO PLANT.

The simplest method of planting in beds, where the bulbs should come in a regular order, at similar distances apart, is to take a long strip of wood or a piece of rope and mark off the bed as follows:—

If the bulbs are to be planted 6 inches apart, procure two little pieces of stick, 6 inches long, and a cord several yards long. Two persons are required, each taking one of the little sticks and one end of the cord. They then place themselves on opposite sides of the bed, and draw the cord across it several times as if sawing with it, until the cord has made a distinct mark in the ground. Then each moves his little stick along the 6 inches of its length, and repeat the operation with the cord. When the bed is finished one way, it must be marked from the other two sides. A bed is very quickly and accurately marked by this method. The bulbs are then placed in position at the intersections of the lines, that is, at the corners of the 6 inch squares. They are then planted with a trowel.

The distance apart at which bulbs are planted vary with the size of the bulbs, and variety of the bulbous plant. Good-sized tulips are best planted 6 inches apart; narcissi from 4 to 9 inches apart. Bulbs of other types and varieties vary considerably in size, and ability to increase in the bed, or borders. Anemones, crocuses, and the smaller bulbs should be planted from 2½ to 4 inches apart. Lilies, from 4 to 9 inches apart, according to the variety. Some lilies, like *Superbum* and *Elegans*, increase quite rapidly, and will have to be taken up, divided, and re-planted after a few years.

Another way to plant bulbs is to remove the soil from part of the bed to the right depth, and place the bulbs in position and as they are thus placed, push them into the soil slightly. The shifted soil may then be returned. Some care is required if this second method is adopted; otherwise, if the soil is returned carelessly, the bulbs are knocked out of position. It has its advantages, however, since it ensures that all bulbs are planted at an even depth, and if the soil is very heavy in character, it may be greatly improved by placing a thin layer of sand immediately under the bulbs.

DEPTH TO PLANT VARIOUS BULBS.

The depth at which to plant almost all types of bulbs is determined to some extent by the type of the soil.

The simplest way to give good advice in this regard is to say that as a rule a bulb should be planted at an average depth varying from three to four times its

diameter. Thus 1¼-inch to 1½-inch tulips should be planted in good garden loam, about 4½ to 5 inches deep. Should the soil be of a very heavy type, 4 inches would be better, while in a lighter type of soil, 5 inches would be a better depth.

The following are average depths:—

Anemones, about 2 inches.
Crocus, about 2 to 2½ inches.
Gladioli, about 3 to 4 inches.
Snowdrops, about 2 to 2½ inches.
Bulbous irises, about 2 to 3 inches.
Tulips, about 4 to 5 inches.
Hyacinths, about 5 to 6 inches.
Narcissi, 4 to 6 inches.
Lilies, about 3 to 7 inches.

BULBS IN THE HOUSE.

The planting of bulbs in pots and bowls is not discussed here, inasmuch as it is a slightly different subject.

The process, however, is equally simple, and the two points of greatest importance are with regard to proper "rooting" of the bulbs, and "watering." Indoor bulb culture may be summed up in a few words, namely: plant as soon as received, in a porous soil; water carefully and not overmuch; keep the plants cool for several months in order to produce good root growth, a temperature of about 40° F. being best; in forcing the plants for bloom, bring the pots first into a temperature of about 50° F., and later as high as 70° F., and let them have lots of sunshine; keep well watered as they are making stem and flower growth.

VARIETIES.

The number of varieties and types of popular bulbs, like the tulip, hyacinth and narcissus, is apt to perplex the beginner. A simple way is to obtain a dealer's catalogue each spring, with some of the popular varieties marked. Take this catalogue and visit the public parks and the homes of your friends who grow bulbs, and check off those which appeal most to your personal tastes.

Some of the varieties which have done well at the Farm for bedding and border planting are as follows:—

EARLY TULIPS (In bloom during the first half of May).

Name.	Colour and Remarks.
Albion	White.
Artus	Scarlet.
Chrysolora	Golden yellow.
Cottage Maid	White, bordered pink.
Duchesse de Parma	Orange or terra cotta, with yellow edge.
Joost van Vondel	Cherry red and white, very fine.
Joost van Vondel White	Pure white, very fine.
Keizerskroon	Bright red, with broad yellow edge.
Mon Tresor	Fine golden yellow.
Prince of Austria	Bright orange vermilion, sweet scented.
Vermilion Brilliant	Brilliant vermilion.

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EARLY DOUBLE TULIPS (In bloom during the middle part of May).

Couronne d'Or	Deep yellow.
Imperator Rubrorum	Bright scarlet.
Murillo	Fine pink.

DARWIN TULIPS (In bloom during the last half of May).

Clara Butt	Deep apple blossom.
Farncombe Sanders	Bright scarlet.
Gretchen	Delicate pink.
Pride of Haarlem	Carmine pink, large flower.

LATE (MAY-FLOWERING) TULIPS (In bloom during the last half of May).

La Merveille	Orange red, large flower, sweet scented.
Picotee Maiden's Blush	White, margined pink.
Sunset	Red and gold.
Isabella	Cream and carmine red.

In addition to the foregoing list of standard varieties of tulips, which have given every satisfaction during the past years in which they have been grown, the Central Farm has under test a large number of the newer varieties of narcissi, tulips, anemones, and other bulbs. During the past two years, the newer varieties of Darwin tulips have given great promise. Some of them are exceedingly attractive and really beautiful flowers for either the border or for cutting. These newer varieties will be reported on in a subsequent report or bulletin.

SOME HELPFUL HINTS.

It would be idle to contend that mistakes are not occasionally made in such simple technique as is required in order to grow bulbs successfully. Such mistakes, however, are more often due to carelessness than to lack of knowledge. The following hints are given to guard the beginner, as far as possible, against mishap. They cover all important steps from the time of ordering to the preparation of the beds for the following year.

1. *Ordering the Bulbs.*—Always order early. If possible, during the summer. Pay a fair price and get a good quality bulb. Fine flowers will result.

2. *When to Plant.*—As soon as the bulbs can be obtained from the dealer, is a good rule. In northern parts of the Dominion, few spring bulbs can be planted too early in the previous autumn. October is a good month.

3. *Where to Plant.*—Plant the early tulips in the formal beds or borders. The late and Darwin tulips are best planted in the borders, where, if grouped in irregular clumps, they make most effective masses of colour. They will do well for several years without being moved. Tulips and narcissi like the sunny spots best, but both narcissi and daffodils do best in those parts of the border where the richest soil is to be found. Underdrain all very damp places.

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4. *Fertilizing the Ground.*—Too much attention is given to the enrichment of the soil for bulbs. The previous statements have indicated that seldom is it necessary to add fertilizer of any kind to soils of ordinary garden quality. When bulbs are planted in borders in which they are to remain for some years, it is advisable to trench in some good stable manure the previous season. Manure in direct contact with bulbs will cause fungous and other rot troubles. Of the commercial fertilizers, superphosphate and ground bone are the best, especially for soil which is to be used for potting bulbs.

5. *Protecting from Frost.*—As soon as the ground is frozen to the depth of several inches, a light covering of coarse manure or straw is helpful to the bulbs, in that it aids in holding the snow. Heavy manure, or wet leaves should not be used, as both will exclude too much air from the bulbs in the spring and autumn. Air and drainage are essential to good root growth. Remove the covering as soon as the ground begins to thaw out in the spring.

6. *Watering in Spring.*—In a dry spring, it may be necessary to water bulbs, such as daffodils. Should such be necessary, apply a big quantity once or twice, rather than a little at frequent intervals.

7. *About Colours and Heights.*—Tulips are obtainable in an immense assortment of colours and types. If colour effects are sought, it is not wise to attempt to obtain them the first year or two. At least, not unless the grower is familiar with the habits of the different types.

The early tulips generally grow about a foot high. The late, or as sometimes called "may-flowering" tulips, grow about the same height, with the exception of a few of them, which grow as high as 2 feet. Darwin tulips, the latest and most beautiful of all types of this popular flower, are generally taller, some growing as high as 2½ feet. They are also varied and exquisite in the range of shades and colours.

Narcissi are generally yellow, in some tint or shade of that colour, or white. In height, they generally average about 12 inches, when grown under suitable conditions.

Both tulips and narcissi are very suitable for cutting. Darwin tulips will last for a week to ten days as cut flowers in the house.

ABOUT TREES AND SHRUBS.

Canada has a large number of beautiful and attractive trees and shrubs, which add dignity and charm to large portions of the Dominion. But, that significant phrase, "a treeless country," vivid in its descriptive force, is also truly applied to large portions of its area. To distribute over the face of such portions some of the beautiful native or suitable exotic trees and shrubs is a task eminently worth while. Not less worth while is the task of making them better known around the homes and in the gardens of the vaster and more favoured portions of the country.

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In round numbers, about four thousand varieties of ornamental trees and shrubs have been tested in the Arboretum, and on the ornamental grounds at the Central Farm at Ottawa. While many of these are not hardy enough for general recommendation, a great number of those tested have been found to be very useful and attractive. From among that number, those in the following lists are selected and recommended for certain special purposes. Inquiries with regard to trees and shrubs for such purposes are very frequently made at the Farm.

SOME REASONS FOR GROWING ORNAMENTAL TREES AND SHRUBS.

A beautiful tree is one of the most beautiful things in all God's creation.

Trees around the home give pleasant shade, and on hot days, moderate excessive temperatures by means of transpiration.

Trees around the home make pleasant contrast with the straight architectural lines of the house, and often add an unconscious charm to the home.

Trees around the house break the force of windstorms, and often protect it from injury.

Shrubs may be grouped into picturesque masses, may be used to screen unsightly buildings, or planted to soften harsh boundary lines.

Shrubs are ornaments in the out-of-door room, which last for many years, and receiving a little attention, grow into a beauty of perfect form and fitness.

Shrubs are beautiful and oftimes fragrant in time of flower, clean and attractive in foliage, and their fruits are often the winter food for our bird friends.

The cost of a tree or shrub spread over the long years of its life, during which it ministers to our higher senses and love of the beautiful, is often less than the cost of one meal.

The worth of trees and shrubs is the worth of subtle influences, directing life's motives into channels leading from the brute towards the Creator.

GOOD STREET OR AVENUE TREES.

American Elm (Ulmus americana).—The best of the larger quick-growing hardy trees for wide streets or avenues.

Basswood, or Linden (Tilia americana or Tilia Platyphyllos).—Both the American and the broad-leaved European varieties make useful trees for either avenues or streets.

Maple, Sugar, or Rock Maple (Acer saccharum).—One of the best known, popular and most useful trees for street planting.

Maple, Norway (Acer platanoides).—This maple does not grow so large as the sugar maple, but forms a round-headed symmetrical tree, hardy and attractive.

Oak, Red or Scarlet (Quercus rubra and coccinea).—The oaks, although of slightly slower growth, make good avenue or street trees. The red and scarlet are the best.

ADDITIONAL TREES USEFUL FOR STREET OR AVENUE PLANTING.

Green Ash *(Fraxinus pennsylvanica lanceolata) (viridis).*
Red maple *(Acer rubrum).*
Pin oak *(Quercus palustris).*
Carolina poplar *(Populus deltoides).*
Maiden-hair tree *(Ginkgo biloba).*
Sycamore *(Platanus occidentalis and orientalis).*
White ash *(Fraxinus americana).*

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GOOD TREES FOR SHADE AND ORNAMENTS AROUND THE HOME.

Purple-leaved Norway Maple.—Produces handsome purple leaves in spring and summer.

Wier's Cut-leaved Silver Maple.—A very beautiful weeping tree.

Western or Japanese Catalpa.—Big handsome leaves, and attractive flowers.

Cucumber Tree.—Big broad leaves, and curious fruit.

Kentucky Coffee Tree.—A rugged looking tree with beautiful leaves.

American Larch, or Tamarack.—Graceful and attractive, pleasing green colour.

Rowan Tree, or Mountain Ash.—Noted for its handsome fruit and pretty leaves.

Laurel-leaved Willow.—A handsome tree with glossy leaves.

GOOD TREES FOR SHELTER BELTS.

Norway Spruce.—A rapid growing tree.

White Spruce.—Makes a very compact tree.

Austrian Pine.—A sturdy compact tree.

Scotch Pine.—Makes rapid growth.

Laurel-leaved Willow.—A large bushy-like tree, dense foliage.

Carolina Poplar or Cottonwood.—The most rapid growing tree of all.

Manitoba Maple.—Rapid growing, the lower limbs extending to the ground.

Caragana arborescens.—A small tree or shrub, but very hardy, with tough branches.

SOME GOOD EVERGREEN TREES FOR PLANTING AS INDIVIDUAL SPECIMENS.

White Spruce.—Several planted together make handsome groups.

Norway Spruce.—Individual trees with their drooping branches are very effective.

Rocky Mountain Blue Spruce.—Koster's blue spruce is the best. This tree, at all stages of its growth, is wonderfully attractive and striking.

Pyramidal Arbor-Vitæ or Cedar.—Without pruning it grows to a tall pyramidal or column-like tree.

Douglas' Golden Arbor-Vitæ or Cedar.—This variety is attractive because of its colour, bright green tipped with gold.

Globe Shaped Arbor-Vitæ.—Its natural shape is globular, produces a good effect when grown in a right setting.

TREES NOT RECOMMENDED, ALTHOUGH OFTEN PLANTED.

Horse Chestnut.—Subject of late years to a fungous disease.

Cut-leaved White Birch.—A beautiful tree, but subject to the attacks of a borer, generally proves fatal.

Silver Maple.—Subject to severe damage from wind, owing to its soft, brittle wood.

Black or Yellow Locust.—Subject to the attacks of a borer, which proves fatal.

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LIST OF THE BEST ORNAMENTAL SHRUBS, CLASSIFIED ACCORDING TO SEASONS OF BLOOM.

Most of the following shrubs will look best when planted in positions where several of the same kind help to form part of a shrubbery border, or a mass of shrubbery. Many of them, however, will form just as fine individual specimens when planted singly, as will those recommended in one of the following lists for individual planting:—

SHRUBS BLOOMING IN EARLY SPRING.

Common Mezereum or Daphne (*Daphne Mezereum*).
Flowering Quince (*Pyrus (cydonia) japonica*).
Garland Flower (*Daphne Cneorum*).
Golden Bell (*Forsythia intermedia*).
Lilacs (*Syringa vulgaris*, named sorts).
Snow Garland or Spiræa (*Spiræa arguta*).
Missouri or Sweet-scented Currant (*Ribes aureum*).

SHRUBS BLOOMING IN SPRING AND EARLY SUMMER.

Broom, in several colours (*Cytisus*, in variety).
Caragana or Siberian Pea-shrub (*Caragana frutescens*).
Honeysuckles, bush varieties (*Lonicera tatarica*).
Honeysuckle, dwarf (*Lonicera Alberlii*).
Japanese rose (*Rosa rugosa*).
Mock orange (*Philadelphus*, in variety).
Meadow Sweet or Van Houtte's spiræa (*Spiræa Van Houttei*).
Snowball shrub (*Viburnum Opulus sterile*).
Weigela (*Diervilla hybrida Eva Rathke*).

SHRUBS BLOOMING IN SUMMER AND EARLY AUTUMN.

Ash-leaved spiræa (*Spiræa sorbifolia*).
Dwarf spiræa (*Spiræa japonica*, Anthony Waterer).
Bladder-Senna (*Colutea arborescens*).
Rose Acacia (*Robinia hispida*).
Shrubby Cinqe-foil (*Potentilla fruticosa*).
Shrubby St. John's Wort (*Hypericum Kalmianum*).
Sweet Pepper bush (*Clethera alnifolia*).
Summer-flowering hydrangea (*Hydrangea arborescens grandiflora*).
Hydrangea (*Hydrangea paniculata grandiflora*).
Smoke tree (*Rhus Cotinus*).
Bush clover (*Lespedeza bicolor*).

BEST SHRUBS WITH COLOURED FOLIAGE.

Golden-leaved mock orange (*Philadelphus coronarius aureis*).
Golden-leaved elder (*Sambucus nigra aureis*).
Golden-leaved ninebark (*Neillia opulifolia aurea*).
Golden-leaved wafer ash (*Ptelea trifoliata aurea*).
Purple-leaved barberry (*Berberis vulgaris purpurea*).
Variegated-leaved dogwood (*Cornus alba variegata*).
Variegated-leaved weigela (*Diervilla rosea variegata*).

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BEST SHRUBS WITH HIGHLY ATTRACTIVE FRUIT.

Thunberg's barberry (*Berberis Thunbergii*).
Burning Bush (*Euonymus*, in variety).
Honeysuckles, bush and climbing (*Lonicera*, in variety).
Oregon grape (*Berberis* (*Mahonia*) *Aquifolium*).
Alder buckthorn (*Rhamnus Frangula*).
Snowberry (*Symphoricarpus racemosus*).
High bush cranberry (*Viburnum Opulus*).
Soft-leaved arrow wood (*Viburnum molle*).
Matrimony vine (*Lycium barbarum.*)

BEST SHRUBS AND TREES WITH COLOURED BARK IN WINTER.

Red-twigged dogwood *(Cornus alba sibirica).*
Purple-twigged dogwood *(Cornus stolonifera).*
Yellow-twigged dogwood *(Cornus stolonifera flaviramea).*
Red-twigged willow *(Salix vitellina Britzensis).*
Yellow-twigged willow *(Salix vitellina aurea)*
Blue-twigged willow *(Salix vitellina glauca).*

BEST SHRUBS FOR PLANTING AS INDIVIDUAL SPECIMENS.

Sweet-scented currant—Yellow flowers in early spring.
Bush Honeysuckle—Pink flowers in May and early June.
Japanese Rose—White or pink flowers in June.
Lilacs, named varieties—Colours range from lavender to deep purple.
Van Houtte's Spiraea—White flowers in June, a beautiful shrub.
Rose Acacia—Pink flowers in June, very handsome.
Mock Orange—Large flowering varieties make a beautiful sight.
Smoke Tree—Unique and quite handsome.
Hydrangea paniculata—The well-known hydrangea.
Viburnum Lantana—Wayfaring tree, a striking shrub.

BEST SMALL TREES FOR INDIVIDUAL PLANTING.

Siberian Pea Tree—Yellow pea-like flowers.
Japanese Lilac—Beautiful white panicles early in July
Flowering Crab Apples—Very beautiful in spring.
Western Catalpa—Where hardy, very attractive.
Russian Olive—Silvery foliage, rapid grower.
Ginnalin Maple—Deeply cut, attractive leaves, bright red in autumn.
Cockspur Thorn—Flowers pretty and foliage good.

BEST EVERGREEN SHRUBS AND SMALL-SIZED TREES FOR INDIVIDUAL PLANTING.

Heath-like Japanese cedar *(Cupressus (Retinospora) ericoides).*
Thread-like Japanese cedar *(Cupressus (Retinospora) filifera).*
Plume-like Japanese cedar *(Cupressus (Retinospora) plumosa).*
Golden plume-like Japanese cedar *(Cupresssus (Retinospora) plumosa aurea).*
Irish juniper *(Juniperus communis fastigiata).*

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Savin juniper (*Juniperus, horizontalis*), (*Sabina*).
Savin juniper, variegated *(Juniper Sabina variegata).*
Dwarf mountain pine *(Pinus montanus Mughus).*
Japanese yew *(Taxus cuspidata).*
Ellwanger's arbor-vitæ or cedar *(Thuya occidentalis Ellwangeriona).*
Hovey's arbor-vitae or cedar *(Thuya occidentalis Hoveyi).*
Siberian arbor-vitæ or cedar (*Thuya occidentalis Wareana).*

CLIMBING PLANTS.

Honeysuckles *(Lonicera* in variety*).*
Climbing bitter-sweet vine (*Celastrus scandens*) and (*C. articulatus*).
Matrimony vine *(Lycium europaeum).*
Self-fastening virginian creeper *(Ampelopsis).*
Dutchman's pipe vine *(Aristolochia Sipho).*
Native and large-flowering clematis.

PLANT BREEDING.

A. J. Logsdail, B.S.A., Assistant in Charge.

The work in connection with Horticultural Plant Breeding for the year 1913 may be conveniently summarized under the three main divisions of Pomology, Vegetable Culture, and Floriculture, and this work may be further subdivided under the headings, the Continuation of Former Work, and the Initiation of New Work.

APPLES.

The plant-breeding work in pomology began early in the spring, with the choice of suitable parent stock for hybridizing purposes as soon as the trees should come into bloom. A series of crosses were made with apples, the varieties used as parents being the following: Baldwin, R. I. Greening, Gravenstein, Northern Spy, MacIntosh Red, Wealthy, Scott Winter, Glenton, and Bingo. The last two named varieties are seedlings of the Northern Spy, and have proved themselves most promising as new apples.

The objects in view in making these crosses were as follows: To obtain an early bearing, heavy yielding, good keeping, and firm apple of first-rate quality, that would begin to bear fruit as early as the Wealthy or Wagener. The climatic conditions during the season of blossoming were not very favourable, nevertheless a number of fruits were secured from these crosses, and seed sown for spring germination.

The following is a list of the crosses made with apple varieties:

18-11—Baldwin, F. X Gravenstein, M.
18-12—R. I. Greening, F. X Gravenstein, M.
18-13—Northern Spy, F. X Gravenstein, M.
18-15—Wealthy, F. X. MacIntosh Red, M.
18-16—Scott Winter, F. X Baldwin, M.
18-19—Glenton, F. X Wealthy, M.
18-20—Bingo, F. X Wealthy, M.

(N.B.—The letter F. denotes the female parent, or tree upon which the fruit was produced, and M. the male parent, or tree from which the pollen was secured.)

Ottawa.

The orchard, containing several hundred seedling apples already in bearing, some fruiting for the first time, has given quite a large percentage of most promising fruit. The work entailed in recording the quality and characteristics of these seedlings is in itself a work of no mean proportions, and is largely undertaken by Mr. Macoun personally.

PEARS.

With regard to pears, several crosses were made between our tender varieties, such as Clapp's Favourite, Clairgeau, Sheldon, and Kieffer, with the more hardy and blight resistant, but otherwise much inferior pears of Russian origin, such as Kurskaya, Zuckerbirn and Lemon pear. The pollen was secured from orchards in the Niagara district and the crosses were effected on the hardy trees in the Experimental Farm orchard. A number of fruits were obtained, and the seed from them sown as in the case with the apples.

The following is a list of crosses made with pears:—

16-17 —Lemon Pear, F. X Clapp's Favorite, M.
16-18 —Kurskaya, F. X Kieffer, M.
16-18a—Kurskaya, F. X Clapp's Favorite, M.
16-19 —Zuckerbirn, F. X Clapp's Favourite, M.
16-21 —Clairgeau, F. X Kurskaya, M.
16-22 —Clapp's Favourite, F. X Kurskaya, M.

An experiment was conducted to ascertain if possible the length of time that pear pollen might be obtained during the winter and saved for hybridizing purposes for the following spring. With this object in view, branches were cut from the varieties Kurskaya, Lemon Pear, and Zuckerbirn, early in February and again in the middle of March. These branches were placed in water in a warm atmosphere. The branches cut in February flowered about March 4, and those cut on March 15 flowered April 9. Pollen was saved from these flowers, thoroughly dried and stored in glass vials. The following crosses were made on May 9, with the pollen that had been secured the March previous:

16.11—Kurskaya, F. X Zuckerbirn, M. (Eighteen fruits, all seedless).
16.12—Kurskaya, F. X Lemon Pear, M. (Twenty-one fruits developed; forty-three seeds).
16.13—Lemon Pear, F. X Kurskaya, M. (No fruits developed).

The following crosses were made with pollen secured during the previous April:—

16.15—Kurskaya, F. X Zuckerbirn, M. (yielded ten fruits, no fully developed seeds).
16.16—Zuckerbirn, F. X Kurskaya, M. (yielded twelve fruits containing twenty-one fully developed seeds).

These facts seem to suggest that the pollen from the Lemon Pear and Zuckerbirn (that produced normal fruit, but having no seeds) was deficient in sexual vitality, but sufficiently potent to cause a pseudosexual enlargement of the torus, or fruit tissues of the receptacle.

The pollen of Kurskaya that had been saved a month, and had been obtained under similar artificial conditions, produced both fruit and seeds. The pollen of Zuckerbirn or Sugar Pear had produced fruit in both instances, but in neither case had the fruit developed any seed.

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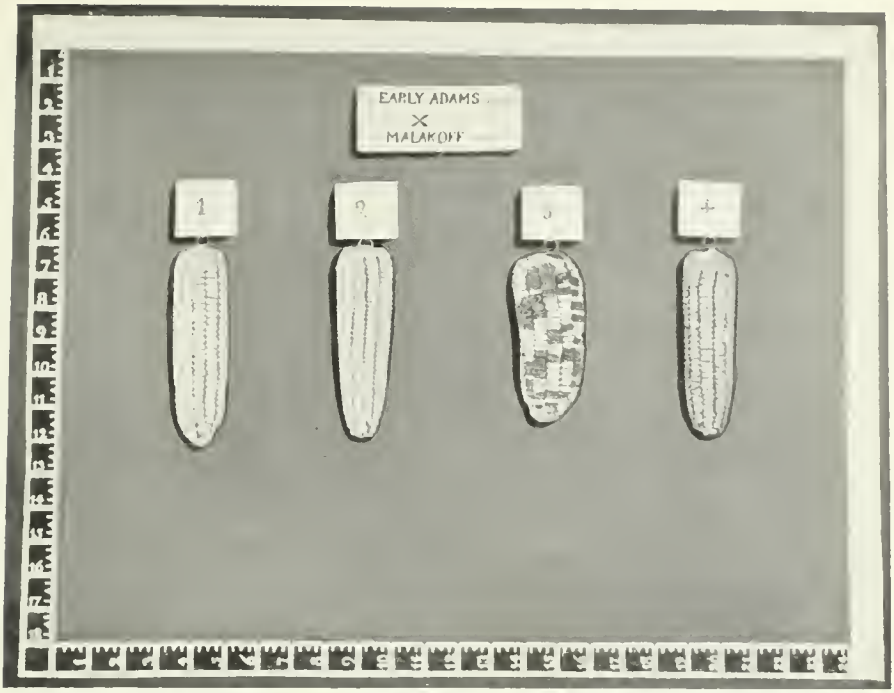

A typical ear of Early Adams (Dent) No. 1 and Malakoff (Sweet) No. 4. Nos. 2 and 3 are types of crossed ears illustrating forms of "blended" and "mosaic" Xenia.

A method of selecting tomato seed.

It might be of scientific interest to state that in the crosses made with the variety Kurskaya as the female parent, fruit was obtained on each of the trees worked upon, but only in the cross Kurskaya X Clapp's Favourite was seed obtained.

The means employed in securing pollen prevented any possibility of contamination. The flowers used for hybridizing purposes were covered with bags before opening, and just prior to the opening they were emasculated and rebagged. It would seem from the above results that the pollen from the Lemon Pear, which was nearly eight weeks old and had been secured from branches of a dormant tree, forced under artificial conditions, had produced fruit containing seeds.

PLUMS.

A large number of seedling plums of the *americana* type have begun to fruit, and during the past season notes were taken on the qualities of the fruit of over two hundred of these young trees. Several of the Caro, Gloria, and Brackett seedlings are very promising, and are being propogated in limited quantities so that stock may be available if they prove to be consistently as good during the next three or four years as in the past.

Several crosses were made with plums, but only three fruits resulted, and these failed to reach maturity.

GRAPES.

With regard to grapes, a quantity of seed was obtained in the autumn of 1912 of the varieties Moore's Early, Campbell's Early, Concord, Worden, Vergennes, Brighton, Champion, Niagara, Salem, and Daisy. Half this seed was sown in the fall, the remainder in the following spring. The autumn-sown seed germinated most satisfactorily, but the other gave poor results. These seedlings will be grown for another season in the nursery row and then planted in permanent positions in the vinery. The object in view being to secure, if possible, an early-maturing, firm, edible grape, that may be grown as far north as the Ottawa valley, with a reasonable chance of commercial success.

The above-mentioned varieties of grapes spring from two origins, the Vinifera and the Labrusca. The following five varieties are considered to be of purely Labruscan origin, namely: Moore's Early, Concord, Worden, Vergennes and Champion. Whereas the varieties Campbell's Early, Brighton, Niagara, Salem and Daisy are of hybrid composition, consisting of Labrusca and Vinifera origins. It has been considered that these grapes of directly hybrid origin afford a most promising field for further improvement among their seedlings, which may be expected to segregate into series of noticeably distinct forms, from which it is hoped may be secured one or two grapes of particular value. The seedlings of purely Labruscan origin are being grown upon the assumption that the origin of such excellent commercial varieties as Concord, Worden, and Moore's Early may be capable of producing even better grapes than these.

VEGETABLES.

The work with vegetables has consisted very largely in selecting and isolating the earliest maturing strains of Malakoff sweet corn and Earliana tomatoes, having at the same time a due regard for the qualities of heavy yield, uniformity, and disease resistance.

During the summer of 1912, a carefully detailed record was secured of the merits of the several strains of Earliana tomato and Malakoff sweet corn grown on the Experimental Farm. In 1913, the best of these strains were selected and planted in isolation, to determine as far as possible their individual merits.

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TOMATOES.

Several crosses were made with the best of the Experimental Farm strains of Earliana with the earliest maturing strains of the varieties Chalk's Jewel, Bonny Best, Dwarf Stone, and Success, with the hope of securing an early, yet firm and fleshy tomato.

The seed from these crosses has been harvested and this work will be developed next season.

It may be stated that although some of the selected strains did not give as good results as had been indicated by the parent stock, the majority, comprising nearly 70 per cent, gave record of improvement over the original strains in varying degrees.

The following table is a record of the yields of the several selected strains at definite periods during the season of fruiting. (The strains such as 23-11, 23-12, 23-13 and 23-14 consist of the average seed selected from several plants of each particular strain during 1912; whereas 23-11A and 23-11B were grown from seed saved from two particularly good plants, selected from amongst the average of 23-11; therefore, by comparing the yield of 23-11A with 23-11, we were able to ascertain whether any advance had been made by this particular selection over the original strains from which it had been chosen.)

The first picking was made on August 6, the last on September 4. This experiment was conducted on a somewhat extensive scale, so that thoroughly reliable data might be obtained for future work in this line. One-hundredth of an acre was planted with the progeny of each plant selection and one thirtieth of an acre with the progeny of the strain. For example, one-hundredth of an acre was planted with progeny from each of 13A, 13B, 13C and 13D, and one-thirtieth of an acre with progeny from 13.

Record No. of strain.	Yield for the first two weeks of cropping.	Yield for the second two weeks of cropping.	Total yield for first month.	Improvement or loss.
	lb.	lb.	lb.	
23-11A	6	165	171	+
23-11B	6	122	128	−
23-11C	8	111	119	−
23-11D	5	141	146	−
23-11	10	147	157	
23-12A	8	134	142	−
23-12B	13	129	142	−
23-12C	13	135	148	+
23-12D	13	108	121	−
23-12	9	134	143	
23-13A	14	149	163	+
23-13B	14	124	138	−
23-13C	14	129	143	−
23-13D	13	152	165	+
23-13	10	142	152	
23-14A	18	176	194	+
23-14B	25	138	163	+
23-14C	11	126	140	+
23-14D	17	120	137	+
23-14	14	122	136	
23-15A	15	121	136	+
23-15B	20	106	126	+
23-15C	21	114	135	+
23-15D	14	103	119	−
23-15	18	106	124	
23-16A	17	113	130	−
23-16B	17	125	142	+
23-16C	14	134	148	+
23-16D	18	120	138	+
23-16	17	115	132	
23-17A	15	144	157	+
23-17B	12	118	130	+
23-17C	16	109	125	+
23-17	13	114	127	

A quantity of tomato seed has been secured for the purpose of distribution to experimentalists. This seed was saved from the best of our early strains and is recommended for northerly districts that have short summer seasons. It has been developed expressly with the object of producing a large proportion of its entire crop within the first three weeks of cropping. This variety does not produce a total yield as great as such varieties as Success, Bonny Best, or Chalk's Jewel, but in districts where early autumn frosts are likely to be experienced, the yield of ripe fruit obtained from these early strains of Earliana have exceeded the yield obtained from varieties that are more generally grown in southern sections. It may here be said, with reference to the growing of this early strain, that the seed has been obtained solely from the earliest ripe fruit, and is now more or less acclimatized to the climatic conditions around Ottawa. It has been noticed, however, that under changed climatic conditions, the seed grown in Ottawa does not succeed as well the first season as seed saved from these plants in the locality to which the seed was originally sent and there grown the second season. In explanation of this fact, it may be pointed out that the plants grown from this seed in a new locality, those that mature, are the most suited to the new climatic conditions in which they find themselves, and being the most successful in producing a crop, are the ones that will be chosen as seed parents. In this way an elimination is made of plants not so suited to the locality in question, and the later results show an encouraging improvement over earlier efforts in growing that crop.

This improvement being a generally acknowledged fact, it behooves large growers of tomatoes to experiment with several varieties until they have found the best and, while doing this, they should save their own seed. In consideration also of these facts, all experimenters who may be testing early strains as distributed from the Central Experimental Farm are requested to report on the quality of the crop produced from the seed they may have procured, and to save seed from this crop to grow a second year. I venture to say that many more would save their own seed were they fully aware of the improvement gained by so doing.

Regarding the saving of tomato seed, the following facts may be of assistance to those desiring to save their own seed:—

1. Choose early, smooth, medium-sized fruits, and keep them until fully ripe.

2. Cut the fruit in half and squeeze the pulp containing the seed into some vessel such as a glass jar, add about one-third the volume of water, leave this in a dark warm room until it shows signs of fermentation (this should be in about two days).

3. Pour the pulp over a wire screen (the screen is made of fine wire, twelve meshes to the inch, or the usual grade of wire screening used for screen doors).

4. Wash the pulp thoroughly with water until all except the seeds has passed through the screen.

5. Leave the seed on the screen to dry (not in the sun).

6. When the seed is thoroughly dried, place it in either a paper or cloth bag, being careful to store it where the mice cannot destroy it.

Explanation of plate.—1, 2, 3, and 4 are troughs over which the seed is washed, the pulp and water flowing into the tubs below. On troughs 2 and 3 may be seen one-twelfth inch mesh screens with seed on them drying. On trough 4 are two screens, the upper one being a coarse screen, mesh one-quarter inch, for rubbing the pulp through on to the finer screen below, the upper screen only sorting out the skin and hard pulp of the tomatoes, the lower for obtaining the seed. Two glass bottles partially filled with tomato pulp, and the hose employed for washing, may also be seen.

OTTAWA.

CORN.

Several crosses have been made with Malakoff sweet corn on Early Adams (Dent), and White and Red Squaws (Flint), with the object of producing an early maturing, yet hardy sweet corn that may be grown successfully in zones with cool summer temperatures, and short seasons. It has been found by experience that certain varieties are able to maintain their growth at low temperatures, that hinder the maturity of other varieties. The Squaw corn is particularly noted for this, the Malakoff requiring a higher temperature. (In explanation of this fact it may be stated that in most southerly and warmer portions of the country, the Malakoff sweet corn matures practically in the same time required by the Squaw, but under the climatic conditions of the prairie, the Squaw is often ready to harvest before the Malakoff has approached maturity.) On account of this fact, these varieties were extensively crossed, and a quantity of this hybrid seed has been secured for sowing next year and selecting therefrom.

In the above photograph, the ears of corn marked 1, 2, and 3 were secured from plants of White Early Adams (a Dent corn) that had been crossed with the pollen of Malakoff, (an early sweet corn) as shown by the ear labelled 4. No. 1 is indistinguishable from a pure ear of Early Adams, the kernels are dented and are a dense opaque white in colour. No. 2, the kernels are semi-transparent except the cap which is not dented and of opaque white. The kernels of No. 3 appear in two distinct forms, some opaque white and dented like pure-bred Early Adams, others semi-transparent and very wrinkled like the pure-bred seed of Malakoff (No. 4).

Several of the earliest-maturing strains of Challenge Black Wax beans were grown and selected for disease resistance. Strains selected in 1912 for vigour and disease resistance have shown improvement over strains where selection along these particular lines was not emphasized.

FLORICULTURE.

With regard to floriculture, a number of second-generation sweet pea hybrids were grown and flowered, nothing of particular varietal worth was secured, but the data recorded elicited information of material value. A number of first and second-generation seedlings of geraniums were grown, and several promising plants were secured, but here again the information regarding the inheritance of these seedlings was of chief value.

Crosses were made with varieties of phlox, petunia, sweet peas and aquilegia, and seed from the majority of these crosses was secured. (Sweet pea seed was secured much more plentifully during the past season than during the season of 1912.)

Plant breeding offers a most promising field for improvement along all lines of horticulture; in fact it would indeed be bold for any one to predict the limitations of the inheritable possibility of any of our commercial fruits, when we compare them with the uncultivated origins from which they undoubtedly have sprung. With the evidence of such wonderful improvements in the past, it must surely be admitted to be only reasonable that the possibilities for improvement in the future should be as great as that of the past.

EXPERIMENTAL STATION FOR PRINCE EDWARD ISLAND.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

Good progress was made with the work of beautifying the lawns, grounds and the Station in general. Visitors who have been at the Station from year to year remark that it hardly seems possible that so much could be accomplished in so short a time. An increasing interest in the growing of flowers and in the beautifying of the homes of the province was shown by the organization of the Floral Association of Prince Edward Island, and by the great success of the Flower Show which was held in Charlottetown, August 28 and 29, 1913.

The small fruits and vegetables attracted much attention and gave very satisfactory returns generally. While this has been an off year with the larger fruits in the province, at the Experimental Station good yields have been recorded.

CHARACTER OF THE SEASON.

The winter of 1912-13 was exceptional, as snow sufficient for sleighing only lay on the ground from February 12 to March 15. The first part of February was very cold. The frost entered the ground to a great depth, as it was not covered by snow. April was unusually mild, the temperature reaching a maximum of 78.75° on the 26th. This brought the trees and grasses much further forward than usual at that season. Crocus, squills and one shrub (*Daphne Mezereum*) came into full bloom. May was cool throughout, light showers of rain fell on twenty different days; this put vegetation back quite as late as the season of 1912; which was much later than the average. The moist weather was ideal for transplanting, and held the spring flowers, such as tulips and narcissus, in full bloom for a long period of time. The temperature of June was 3° below the mean average. A minimum temperature of 33.5° indicated that frost had not occurred at the station buildings, although hoar frost was observed elsewhere on the farm on four different nights. These frosts were so severe in some sections of the province that considerable damage to the bloom of the fruit was reported. The frequent showers and the moderate temperatures of July made it a very favourable month for all crops. The almost entire absence of the Colorado potato beetle was noted. Cut worms and root-maggots were, however, numerous and destructive. The Carrot Rust fly occurred very generally over the province and with few exceptions destroyed the carrot crop. August was a very favourable month for growth and for the maturing of fruit and vegetables. With the exception of the second week in September (which was wet) it was a very fine harvest month. A light frost occurred on the night of the 30th which killed a few of the very tender plants. October was a month of surprises. No frost was recorded at this station. The rainfall was excessive and almost continuous. A mean temperature of over 55° was a record breaker, and almost as high as September. The hours of actual sunshine were about one-half the average of a number of years. These conditions gave wonderful autumn bloom of dahlias, roses and carnations. The late annuals and all the late perennials made a grand showing. During this favourable time most of the varieties of grapes ripened. The month of November was very mild, the lawns on the 15th being as green as in the spring.

AREA DEVOTED TO HORTICULTURE.

The area devoted to horticulture was increased by about 1 acre, making a total with wood lots and avenues, of 22 acres. The driveways of the Station have already become one of its outstanding features. The introduction of automobiles has increased their popularity. Further improvements were made to the picnic grounds and to the lawns and surroundings about the Station buildings, which were much admired.

LARGE FRUITS.

APPLES.

The apple orchard that was set in 1910 made very satisfactory growth. The green aphis was quite bad on a number of trees. The season seemed to be very favourable to these insects, as they appeared in great numbers on many different trees and plants. No fruit was borne on these young trees. The loss from all causes was very slight; sixty-five trees were received from the Central Farm and were set out to the west of the apple orchard. A number of trees in the old orchard were removed to make room for hedge rows and to make room for others. The trees were all carefully sprayed with lime sulphur three times. Poison was added to the third spray to destroy the codling moth. A good crop of apples was harvested from the remaining trees of the old orchard.

CHERRIES.

The cherry trees have grown rapidly. They were loaded with bloom; the greater part of the bloom was destroyed by frost, causing a short crop of cherries. The small quantity of fruit that matured was only of fair quality.

PLUMS.

The plum trees have been wonderfully free from disease, and have made good growth. About one-third of the trees bore some fruit. Some of them bearing from 3 to 4 pounds. Lombard, Monarch, and Grand Duke gave the most fruit.

PEARS.

The pear trees continue to outstrip the other fruit trees planted at the same time, the Lucrative trees again being loaded with fruit.

SMALL FRUIT.

GRAPES.

The mild weather of October was very favourable to the ripening of the grapes which bore great loads of fruit. The Winchell and Moyer ripened before the 11th of the month. The Peabody gave the heaviest average yield, and its fruit was of excellent flavour. The Delaware and Golden Drop had good flavour, while the Wilder, Worden, and Lindley gave good yields that ripened after being picked for a time.

CURRANTS.

The bushes of red and white currants were again loaded with fruit. Knight's Large Red and Greenfield leading in the red, and Kaiser and White Cherry leading

among the white in yield. The fruit was all of good quality. A number of new varieties were set out. A frost injured the bloom on the black currants so that they were a very short crop. The Saunders again led among the varieties.

GOOSEBERRIES.

The fruit on the gooseberries was the finest we have had since they were set out. All of the varieties bore well, but Keepsake and May Duke led the others by quite a margin for this season. The currant worm was numerous and required frequent attention.

RASPBERRIES.

The Black Cap raspberries that were destroyed by anthracnose in 1912 were pulled up and burned, and the plantation of red and purple was extended. Loudon (red) led all the varieties of raspberries for the year, with Shaffer (purple) a close second. The Herbert and Cuthbert (red) gave most excellent fruit, but were more injured by the hard winter than the Loudon. The Golden Queen (white) gave fruit over a long period of time, but not a sufficient quantity to give it a place with the others.

DEWBERRY.

The Lucretia dewberry plants were badly killed back by the winter, and gave a very small quantity of fruit.

BLACKBERRIES.

Blackberries were a little more promising than any season since they were planted. They are so badly winter-killed that they cannot be recommended as a sure crop.

STRAWBERRIES.

The plants set in 1911 were hoed and sprayed in the spring of 1913. They gave a second crop almost as great as the first crop that was harvested last year. There was only a slight change in the order of yield. Bisel led Warfield by a few boxes, then Glen Mary, Bubach, Bederwood, President, and Parson's Beauty in the order named, all gave good yields. A new plantation was set out in May which made splendid growth during the summer.

TREES AND SHRUBS.

The large collection of trees and shrubs that has been set out about the Station made good growth and a very large percentage of them was covered with bloom in their season, the many varieties of Spiraea alone giving almost continuous bloom throughout the summer. The plantation along the railway improved greatly in appearance, the flowering shrubs being quite showy for several months.

VEGETABLES.

One hundred and seventy plots of vegetables were tested in 1913. The weather conditions on the whole were favourable to the majority of these. Many of the old pests were in evidence, with a few comparatively new ones; among these the most destructive was the Carrot Rust Fly, which was general throughout the province. Spraying with tobacco water from the time the young plants were well up until the middle of July proved quite effective. Keresene emulsion or whale oil soap are also recommended. Cutworms were controlled by the poisoned bran mash. The green aphis, which was more numerous than we had ever seen it before, was fairly well checked with kerosene emulsion.

CHARLOTTETOWN.

ASPARAGUS.

The bed of asparagus that was planted in 1910 has made good headway and gave a much larger yield than the previous year.

BEETS.

Meteor again led the list of table beets, as it did last year, Early Dark Red Turnip and Early Blood Red Turnip being the first ready for the table.

BEANS.

The dull weather was favourable to the growth of the enemies of the beans. Anthracnose again did much damage. During the very wet autumn many of the beans were destroyed by mildew. There was an excellent crop of green beans and the quality good.

BRUSSELS SPROUTS.

The crop of Brussels sprouts was quite satisfactory. Dwarf Improved was the variety grown.

CABBAGE.

Sixteen varieties of cabbage all gave splendid returns. Even the earliest were late this season. The only injury recorded was from club-root, which was introduced through the soil of the hotbed.

CAULIFLOWER.

Very fine heads of cauliflower were grown; the Early Snowball was considered best.

CARROTS.

As already mentioned, the carrots were very little better than a failure except where we used tobacco water to destroy the Carrot Rust Fly larvæ. French Horn gave the best yields.

CUCUMBERS.

This was the most favourable season for cucumbers that we remember. They were fit for use on the 23rd of August and, though partly killed on the 30th of September, good fruit was picked from them as late as the last of October. Cool and Crisp led Peerless White Spine by a small margin. These two were much the heaviest croppers.

CORN.

On the 7th of September the first corn (Early Malcolm) was ready for use. On the 17th of October the following varieties that were fit for use at that time were harvested: Early Malcolm, Early Iowa, Fordhook Early, Perkins Early, Golden Bantam, and Extra Early Adams; these were fit to use in the order named. Those that matured fit for use in the shock were Black Mexican and Henderson's Metropolitan. No ears ripened.

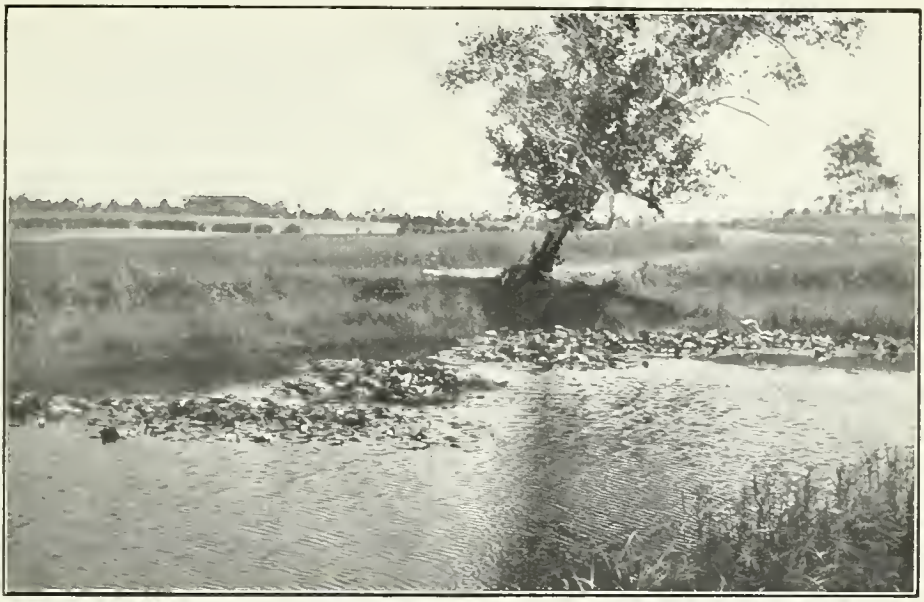
LETTUCE.

Among the many excellent varieties of lettuce grown, Grand Rapids was the best and most satisfactory.

ONIONS.

Onions that were sown early did very well. The Large Red Wethersfield gave the best returns. Danvers Yellow Globe also matured good onions.

CHARLOTTETOWN.



Lily Pond, Experimental Station, Charlottetown, P.E.I., 1913.

Paeonies, Iris and Shrubs, May 1913, Charlottetown.

PARSNIPS.

One variety (Hollow Crown) produced a very large crop of good roots.

PEPPERS.

Peppers were a failure, no fruit formed.

PARSLEY.

The double curled variety produced an abundance of very fine leaf.

PEAS.

Twelve varieties of garden peas were grown, one-half of each row was pulled green and the other half allowed to ripen. The first ready for use were the Gradus and Gregory's Surprise. The vines made a tremendous growth, the dwarf varieties growing as high as the standards usually do, and the standards growiug 9 feet high. They all ripened up well. Stratagem, Thos. Laxton, Ameriean Wonder, and Gregory's Surprise gave the best returns.

TOMATOES.

This was a banner year for tomatoes, no less than ten varieties matured fruit. Sparks' Earliana (Sunny Brook strain) with a yield at the rate of over one thousand bushels per acre led with the largest amount of marketable fruit. Alacrity 2-24-9 had a greater total yield but a smaller amount of saleable fruit. These were closely followed by I.X.L., Bonny Best, Rennie's Earliest, and Prosperity. The fruit remained on the vines without being injured by frost until October 15.

TURNIPS.

Among the turnips grown, the Extra Early White Milan was the best.

SQUASH.

The squash patch was a feature of the vegetable garden. They not only took possession of the land but produced squash at the rate of over 20 tons per acre. Long Vegetable Marrow led with a yield at the rate of 27 tons 1,500 pounds per acre. The most popular varieties are the Hubbard and the Golden Hubbard.

POTATOES.

The uniform test plots of potatoes were grown in the orchard. A check row was grown on either side of the rows of apple trees. The land was under cover crop the previous year. It received about 15 tons of manure per acre of well-rotted barnyard manure, which was well worked into the land a week before planting. The seed was cut into large sets by quartering the potatoes, and planted on May 30. The plants were sprayed regularly and thoroughly with Bordeaux. No blight was observed. The yield per acre was computed from the weight of one row 66 feet long. The tubers were dug October 23, and were very free from rot. Rows 30 inches apart, plants 12 inches apart in the rows.

POTATOES, Test of Varieties, 1913.

No.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour and Form.
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	
1	Table Talk	486	35	428	58	57	37	Round, white.
2	Empire State	407	36	349	59	57	37	Long "
3	Reeves Rose	369	11	326	30	42	41	" pink
4	Early White Rose	324	23	262	30	61	53	" white.
5	Bliss Triumph	315	50	268	53	46	57	Round, pink
6	Selina Burbank	313	42	258	13	55	29	Long, white
7	Lion's Paw	305	10	277	26	27	44	Oval "
8	Dreer's Standard	290	14	258	13	32	1	Round "
9	Irish Cobbler	281	41	228	20	53	21	" "
10	McIntyre	271	1	247	33	23	28	Long, blue.
11	Orwell Square	268	53	198	28	70	25	Oval, white.
12	Late Puritan	268	53	232	36	36	17	Long "
13	Fitzgerald	266	46	226	13	40	33	Round "
14	Gold Coin	265	41	225	8	40	33	" "
15	Carman No. 1	258	13	217	40	40	33	" "
16	Green Mountain	251	49	202	44	49	5	" "
17	Burbank's Seedling	251	49	209	8	42	41	Long "
18	Wee McGregor	247	33	215	32	32	1	Round "
19	Money Maker	247	33	209	8	38	25	" "
20	American Wonder	230	29	194	12	36	17	Long "
21	Vick's Extra Early	225	8	198	28	26	40	" "
22	R. New Yorker	192	4	151	31	40	33	" "
23	Up to Date	192	3	130	10	61	53	Round "
24	Factor	185	30	128	2	57	37	Long "
25	Morgan's Seedling	171	47	131	14	40	33	" "
26	Garnet Chili	140	50	130	10	10	40	Oval, red.
27	Hard to Beat	138	43	87	30	51	13	Round, white.
28	Sutton's White City	138	42	123	46	14	56	Long "
29	" Acquisition	121	38	61	53	59	45	Round "
30	Rochester Rose	115	14	61	53	53	21	Long, pink.
31	Rawlings (Ashleaf) Kidney	91	45	70	25	21	20	Round, white.
32	California Red	78	57	68	17	10	40	Oval, pink.
33	Dalmeny Beauty	64	1	42	41	21	20	" white.

A series of experiments started in 1912 with potatoes was continued this season, and more definite information obtained, last year's results being greatly influenced by injury to seed. The plots were planted May 30 and dug October 23. The land was prepared as mentioned for the test of varieties, the fertilizer experiment had the commercial fertilizer applied in addition to the manure mentioned.

TEST of Different Methods of Cutting Sets—Late Puritan.

Weight of Sets per Acre.		No.	Method Used.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.	
Bush.	Lb.			Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
88	..	1	Whole potatoes 1 foot apart	492	58	418	17	74	41
44	..	2	Base half of potato 1 foot apart	467	21	414	.	53	21
44	..	3	Whole potatoes 2 feet apart	403	20	349	59	53	21
44	.	4	Seed end of potato 1 foot apart	369	11	307	18	61	53
17	36	5	2 eyes to each set 1 foot apart	213	24	202	44	10	40
22	.	6	One-quarter of potato split lengthwise	179	52	170	43	34	9
13	12	7	One eye to each set 1 foot apart	67	13	62	57	4	16

CHARLOTTETOWN.

This experiment would seem to indicate that it is not the number of eyes in a set, but the amount of food stored there that gives the young shoot such a vigorous start that it may later produce a heavy crop.

The experiment with fertilizers would indicate that a complete fertilizer applied at the rate of 400 pounds per acre in the following proportion: Nitrate of soda, 125 pounds; superphosphates, 175 pounds and muriate of potash, 100 pounds; in addition to barnyard manure gave the best return for the investment, increasing the yield 145 bushels and 7 pounds per acre. Basic slag gave no increase over the check.

The experiment with fresh-cut sets limed and not limed, planted at once or held for a week indicated that sets limed and planted at once gave the best returns.

The potatoes planted June 6 gave a heavier crop than those planted either a week earlier or at any later date this season.

A test was made to determine the best distance apart to plant potatoes in the row, and also to determine the best distance to leave between the rows. This year the distances we have been using for a number of years, namely, 12 inches between the plants in the row and 30 inches between the rows gave the best returns. The other distances tried were 14 and 15 inches between plants in the row and 33 and 36 inches between the rows.

FLOWERS.

ANNUALS.

About 150 lots of annual flower seeds were planted in hotbeds the second week in April; they germinated very quickly and were transplanted out during the moist weather of May. These, together with about 150 others that were planted in the open, were used to decorate the Station grounds. They made a wonderfully fine showing throughout the whole season, the moist mild autumn causing many of them to continue in bloom until the last of October. *Phlox Drummondii* were the finest we have seen. The asters were very much better than we have ever had before, the blight not doing nearly as much injury as formerly. The following deserve special mention owing to the profusion of their bloom: Antirrhinum, marigold, portulaca, sweet peas, candytuft, and poppy. The verbena, and coreopsis, and salpiglossis were the finest we have yet had at this Station.

BULBS.

The showing of bulbs planted in October of the previous year was simply finer than we can describe. They began blooming two weeks earlier than usual, and the moist weather of May lengthened their blooming period so that some of them were still blooming the last of June. They formed splendid bulbs and many of these were taken up and planted again in the late autumn, along with over 5,000 new ones from Holland.

PERENNIALS.

These beautiful flowers are very satisfactory to the busy people that are living in the country, because just at the busy season when the annuals need attention, these can be left to take care of themselves for a time. We thought we had had beautiful pæonies before, but they never came anywhere near in size or amount of bloom of those of the past season. Perennial phlox, roses, and dahlias were almost their equals for amount of bloom, and they exceeded the pæonies in period of bloom by several months, continuing as they did right up to the 1st of November. Besides the ones mentioned and the many others that have been tested from year to year in the perennial borders, about 134 new lots of perennials were sown in cold frames and transplanted out in the autumn. These made excellent growth and should add greatly to the appearance of the grounds in future years.

The Kentucky waterlilies were admired by thousands. They were often the first thing inquired for by visitors, their fame having gone throughout the province.

EXERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B. S. A.

EFFECT OF SEASON ON HORTICULTURAL CROPS.

The season of 1913 was not as good as that of previous years for the horticultural plants. Although the winter was not so severe as far as low temperature was concerned, still the ground was left open to what frost there was, as we had very little snowfall during the winter 1912-13. The roots of the small fruits being thus left unprotected, a large amount of winter-killing was noticeable. Spring opened giving promise of early growth, but proceeded to be otherwise, being very unsettled.

A large amount of rainfall was recorded, and frost was registered several times during May and June, causing damage to different fruit blooms, strawberries in particular.

The apple crop was below the average, both in quality and quantity, there being very little colour, due no doubt to the limited amount of sunshine, which was very small in comparison with that of previous years.

Although the lack of sunshine was a drawback to the fruit crop it did not damage the growth of the shrubs and flowers, it being in favour of the latter, as very little wilting was noticeable in transplanting from the hotbeds to the open, thus giving them all a good start.

Some Weather Observations taken at Nappan, N.S., Experimental Farm, 1913.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	Heaviest in 24 Hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	23·96	52	— 4	2·42	5·0	2·92		86·75
February	13·31	51	—15	·45	17·0	2·15		112·15
March	32·52	62	— 1	2·04	41·2	6·16		140·00
April	40·03	71	14	3·01	4·5	3·46		132·70
May	47·75	67	26	2·38		2·38		169·15
June	54·56	74	31	1·97		1·97		265·90
July	62·33	82	41	4·98		4·98		226·05
August	61·09	80	33	3·76		3·76		238·10
September	54·59	78	31	2·70		2·70		165·95
October	55·28	72	28	7·83		7·83		71·30
November	38·09	65	10	1·63	4·0	2·03		115·45
December	27·5	55	0	2·65	16·0	4·25		80·20
Total for year				35·82	87·70	44·59		1803·70
Average for five years				32·17	62·94	38·47		1925·50
Total for six growing months, April to September				18·80	4·5	19·25		1197·85
Average of five years for six growing months, April to September				17·63	3·3	18·16		1228·21

COMMERCIAL ORCHARD.

The small commercial orchard, which was planted in 1911, came through the winter very well and made a vigorous growth during the summer. Some of the early varieties, such as Duchess and Wealthy, produced some fruit.

The object of this orchard is to demonstrate what it actually costs to start a young orchard and care for it from infancy until it gives a return equivalent to the amount expended on it, and as to how long before the production will be sufficient to cover all investments. In order to arrive at a uniform valuation of labour and production from year to year, set prices are used for labour and production, *i.e.*, manual labour is charged at 17 cents per hour, one-horse team at 27 cents, two-horse team at 34 cents, and so on. The value of the crops is calculated in the same way, *i.e.*, wheat, oats, barley, rye, and buckwheat, 1 cent per pound, and so on for other crops according to their value above those mentioned. Records of these are reported in the annual bulletin from this farm.

The following is a record kept of the cost of labour since its inception:

Cost of Commercial Orchard, Started in 1911.

Date.	Number of hours Manual Labour.	Cash.	Number of hours horse labour, with teamster.	Cash.	Work engaged at.	Crop.	Revenue.
		$ cts.		$ cts.			$ cts.
1911		69 50		28 80			
1912		19 50		23 90		117 bushels barley at 60c	70 20
April 15, 1913	To 1 man, 1 day at $1.70	1 70	To 1 horse, 1 day at $2.70	2 70	Spraying (lime wash)		
May 2 "	To 2 men, ½ day at $1.70	1 70			Replacing trees		
" 7 "	To 1 man, ½ day at $1.70	85			Pruning		
" 18 "			To 1 team 1 day at $3.40	3 40	Harrowing (springtooth)		
" 21 "	To 1 man 1 day at $1.70	1 70	To 1 horse 1 day at $2.70	2 70	Spraying (Bordeaux)		
June 8 "			To 2 teams 2 days at $3.40	13 60	Ploughing		
" 15 "			To 1 team, ½ day at $3.40	1 70	Harrowing (disk)		
July 11 "			To 1 team ½ day at $3.40	1 70	Harrowing (smoothing)		
" 16 "	To 1 man, ½ day at $1.70	85			Sowing rape seed		
" 16 "	To 15 lbs. seed at $1.30	1 95			Rape seed		
" 16 "			To 1 team' ½ day at $3.40	1 70	Harrowing (smoothing)		
Sept. 15 "			To 1 team, ¼ day at $3.40	.85	Mowing (rape)		
Oct. 7 "	To 1 man ½ day at $1.70	85			Pruning suckers		
Nov. 24 "	To 1 team 2 days at $1.70	3 40	To 1 team 2 days at $2.40	6 80	Manuring		
Nov. 25 "	To 25 tons manure at $1.00	25 00					
		127 00		87 85		Total revenue	70 20
			Cost of manual labour	127 00			
			Total cost	214 85			

EXPERIMENT WITH POTATOES.

Twenty varieties of potatoes were planted in uniform test plots of one-hundredth of an acre each.

The land was of medium to heavy clay loam, ploughed from pasture the previous year. Manure was applied on surface, and ploughed under, the fall of 1912. It was cutaway harrowed once in the spring of 1913, crossed ploughed with gang plough, again cutaway harrowed twice, and smoothing harrowed once. Drills were run 28 inches apart and all seed was dropped by hand on June 6 at the rate of 25 bushels per acre, the seeds being 12 inches apart in rows. They were harrowed down and ploughed up twice before they came up, were gone over twice with a hoe and cultivated four times with a one-horse cultivator. Sprayed twice during the season with Bordeaux mixture. All varieties made a strong growth.

The following table gives the comparative results:—

POTATOES.

Name of Variety.	Character of Soil.	Size of Plot.	Planted.	Dug.	Character of Growth.
		Acres.			
1. American Wonder	Clay loam.	1/100	June 6	Oct. 22	Strong
2. Carman No. 1	"	1/100	" 6	" 8	"
3. Vick's Extra Early	"	1/100	" 6	" 22	"
4. Morgan Seedling	"	1/100	" 6	" 22	"
5. Gold Coin	"	1/100	" 6	" 22	"
6. Rochester Rose	"	1/100	" 6	" 22	"
7. Rawlings' Kidney (Ashleaf Kidney)	"	1/100	" 6	" 22	"
8. Empire State	"	1/100	" 6	" 22	"
9. Factor	"	1/100	" 6	" 22	"
10. Money Maker	"	1/100	" 6	" 8	"
11. Irish Cobbler	"	1/100	" 6	" 8	"
12. Hard to beat	"	1/100	" 6	" 8	"
13. Late Puritan	"	1/100	" 6	" 8	"
14. Everett	"	1/100	" 6	" 22	"
15. Dalmeny Beauty	"	1/100	" 6	" 8	"
16. Reeves' Rose	"	1/100	" 6	" 22	"
17. Dreer's Standard	"	1/100	" 6	" 8	"
18. Table talk	"	1/100	" 6	" 22	"
19. Wee McGregor	"	1/100	" 6	" 8	"
20. King Edward	"	1/100	" 6	" 8	"

Average, 22,350 pounds or 375 bushels, 50 pounds.

When Matured.		Average Size.	Quality.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Market-able.		Yield per Acre of Unmar-ketable.		Form and Colour.
				Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	
Oct.	22	Large	Good	461	40	426	46	35	..	391	40	70	..	Long, white.
"	12	Medium	"	420	..	420	..	..	..	358	20	61	40	Round, white
"	22	"	"	478	20	426	40	51	40	375	..	103	20	Long, pink and white.
"	22	Large	Fair	303	20	282	30	20	50	261	40	41	40	Oblong, pink and white.
"	22	Medium	Good	416	40	387	30	29	10	358	20	58	20	Round, white.
"	22	Large	Fair	470	..	470	..	..	..	403	20	66	40	Oblong and pink.
"	22	Medium	Fair	416	40	366	40	50	..	316	40	100	..	Flat, round, white
"	22	Large	Poor	318	20	288	20	30	..	258	20	60		Long, white.
"	22	Medium	Poor	228	20	207	30	20	50	186	40	41	40	Round, white.
"	8	Large	Fair	271	40	271	40	..	..	200	..	71	40	Long, white.
"	12	Medium	Good	510	..	510	..	..	..	441	40	68	20	Round, white.
"	8	Small	Poor	233	20	233	20	..	..	183	20	50	..	Round, white.
"	8	Medium	Fair	466	40	419	10	47	30	371	40	95	..	Long, white.
"	22	Large	Poor	546	40	473	20	73	20	400	..	146	40	Flat, round, white
"	8	Medium	Fair	245	..	217	30	27	30	190	..	55	.	Long, white.
"	12	"	"	306	40	286	40	20	..	266	40	40		Oblong, pink.
"	12	"	Good	251	40	251	40	..	..	205	..	46	40	Round, white.
"	22	Large	Poor	441	40	408	20	33	20	375	..	66	40	Round, white.
"	28	"	Good	556	40	556	40	..	..	478	20	78	20	Oblong, white.
"	8	Medium	Fair	173	20	173	20	..	..	115	..	58	20	Oblong, white and pink.

From the above table it will be noted that the Wee McGregor gave the largest yield, it being 556 bushels 40 pounds per acre, and that 85·9 per cent of them were marketable potatoes of a large size and good quality;

That Everett, second largest yielder, gave 546 bushels 40 pounds per acre, but had only 73·2 per cent marketable potatoes of large size and poor quality;

That Irish Cobbler, third largest yielder, gave 510 bushels per acre and had 86·4 per cent marketable potatoes of medium size and of good quality.

Vick's Extra Early comes fourth in the list, with a total yield of 478 bushels and 20 pounds, and had 78·4 per cent marketable of medium size and good quality.

That Rochester Rose came fifth, with 470 bushels per acre and had 86·1 per cent marketable, large and only fair quality. Late Puritan sixth, 466 bushels and 40 pounds per acre, had only 79·6 per cent marketable ones of medium size and fair quality. American Wonder seventh, with a yield of 461 bushels 40 pounds, had 84·8 per cent marketable potatoes of large size and good quality. Table Talk, which was eighth, was large and of poor quality. Carman No. 1, while ninth, is one of the best and yielded 420 bushels per acre, with 85·3 per cent marketable potatoes of medium size and excellent quality.

Hence, in concluding, would state that the following are the most productive varieties, quality and size considered, for this section: Wee McGregor, Irish Cobbler (Early), Carman No. 1, and Vick's Extra Early, that is of the above twenty varieties tested.

STRAWBERRIES.

This year the yield of strawberries was not as good as in former years, neither in quantity nor quality. This no doubt was due to the previous wet fall, which kept them from getting the thorough cultivation which all strawberry plantations require, and consequently they had to be mulched without such. When the mulching was removed this spring we found a number of plots almost entirely winter-killed.

The size of the strawberry plots was 16½ by 5 feet, or 1/52s of an acre.

From the recorded list, twenty of the most productive varieties; together with their yields, are named as follows:

No.	Name.	Yield per plot.	Yield per Acre.
		Quarts.	Quarts.
1	Michel's Early	18	9,504
2	Crescent	15	7,920
3	Howard No. 17	14	7,392
4	Parker Earle	13	6,864
5	Seedling No. 15	13	6,864
6	Haverland	13	6,864
7	Clyde	12	6,336
8	John Little	12	6,336
9	Seedling No. 12	11	5,808
10	Bisel	11	5,808
11	Sample	11	5,808
12	Capt. Jack	11	5,808
13	Carleton	11	5,808
14	Wolverton	11	5,808
15	Barton's Eclipse	11	5,808
16	Greenville	10	5,280
17	Ida	10	5,280
18	Beverly	10	5,280
19	Thompson's Late	10	5,280
20	Bederwood	9	4,752

SQUASH.

Ten varieties were planted on June 7, all making fairly good growth. The plots were 3 by 5 feet, with twelve plants to the plot.

No.	Name.	Fit for Use.	Size.	Date of Harvesting.	Yield per Plot.
					Lbs.
100	Carter's Trailing White Vegetable Marrow	Sept. 15	Large	Oct. 1	196
99	Hubbard	Oct. 1	Medium	" 1	128
96	Long White Bush Marrow	" 1	"	" 1	80
94	Delicata	Sept. 15	Small	" 1	69
101	Golden Hubbard	Oct. 1	Medium	" 1	67
98	Mammoth Whale	" 1	Large	" 1	44
103	Delicious	" 1	Medium	" 1	43
93	Summer Crookneck	" 1	Small	" 1	36
95	Custard Marrow	" 1	Medium	" 1	27
97	White Congo				

CABBAGE.

Five varieties of cabbage were sown in hotbeds on the 7th of April, pricked off on the 28th, and transplanted into the open on June 10. Each plot consisted of two rows 30 feet long, 30 inches apart. These in turn comprised forty plants, which were 18 inches apart in the rows. Ten average heads in each variety were weighed and recorded as follows:—

EARLY CABBAGE.

No.	Name.	Fit for Use.	Quality.	Weight of Average Heads.	
				Weight per head.	Weight of ten heads.
				Lb	Lb.
18a	Flat Swedish	Aug. 3	Good	12	120
18	Lubeck	" 10	"	11	110
18b	Danish Summer Ballhead	" 10	Medium	9	90
18c	Imported Amager Danish Ballhead	" 10	Good	7	70
15	Early Paris Market	July 24	"	7	70
16	Extra Early Midsummer Savoy	Aug. 1	"	7	70
14	Early Jersey Wakefield	July 13	"	6	60
17	Small Erfurt	Aug. 6	"	6	60

LATE CABBAGE.

19	Fottlers Imp. Brunswick	Aug. 12	Good	12	120
20	Large Late Drumhead	" 16	"	11	110
23	Copenhagen Market	" 16	"	10	100
22	Winningstadt	" 16	"	9	90
23c	Extra Amager Danish Ballhead	" 20	Medium	9	90
23d	Danish Red Delicatesse	" 20	"	5	50
23b	Red Danish Stonehead	" 16	"	5	50

CAULIFLOWER.

Three varieties were sown in hotbeds on May 10 and transplanted into the open on the 3rd of July. Two rows of each were planted 30 feet long and 30 inches apart, each row consisting of forty plants 18 inches apart. Note was taken of the number of good heads, which is given below:—

No.	Name.	Fit for Use.	Quality.	Number of really good heads.
24	Early Snowball	Sept. 5	Good	7
24a	Danish Giant	" 10	Medium	5
25	Selected Erfurt	" 10	"	3

TOMATOES.

Ten varieties of tomatoes were sown in hotbeds on the 7th of April. These germinated between the 14th and 16th of the same month, and were planted out in the open on June 26, five plants in each variety 4 by 4 feet apart. As none were allowed to ripen they were all harvested green.

The following table gives the comparative results:—

No.	Name.	Quality.	Weight.
			Lb.
111	I.X.L	Poor	48
107	Rennie's XXX Earliest	Good	38
104	Sparks Earliana	"	37
108	Florida Special	"	33
105	Chalks Early Jewel	"	27
106	Bonny Best	"	25
110	Alacrity	Fair	21
109	Alacrity	"	17
112	Prosperity	None	..
113	Earliana, Langdon	"	....

ONIONS.

Four varieties were sown in hotbeds on the 8th of April. These were transplanted in the open on June 11 in rows 30 feet long and 15 inches apart. These were weighed when pulled, with the following results:—

No.	Name.	Fit for Use.	Colour.	Quality.	Weight.
					Lb.
72	Large Red Wethersfield	Sept. 14	Red	Very good	47
70	Salzer's Wethersfield	" 28	Red	"	36
71	Danvers Globe	Oct. 1	Yellow	"	34
69	Johnson's Dark Beauty	Sept. 28	Red	"	31

GARDEN PEAS.

Twelve varieties of peas were planted on the 16th of May in rows of 30 feet long and 30 inches apart, the peas being 1 inch apart in the rows.

The following is a record kept of the various varieties:—

No.	Name.	Fit for Use.	Size of pod.	Per cent good.	How filled.	Dates and Yields.				Total.
						Aug. 12	Aug. 20	Aug. 30	July 30	
			Inches.			Lb.	Lb.	Lb.	Lb.	Lb.
81	McLean's Advancer	Aug. 12	2	100	Good	11	9	4		24
83	Stratagem	" 21	2½	100	"		15	8		23
78	Gregory's Surprise	July 30	2	80	"	6	7	6	4	23
80	American Wonder	Aug. 12	2½	90	"	17½		4		21½
87	Notts New Perfection	" 12	2	85	Medium	12	3	4		19
79	Gradus	" 30	3	90	"	10	5	3		18
84	Telephone	" 12	3	95	"	5	7	5		17
82	Heroine	" 12	2	100	Good	8	7	2		17
86	Premium Gem	" 12	2	95	"	11¼	2½	2		15¾
85	Thomas Laxton	July 30	3	80	Medium	7		3	5	15
88	Sutton's Excelsior	Aug. 20	2	80	Good		9	3		12
89	Juno	" 12	2	90	"	2		5		7

GARDEN BEANS.

Seven different varieties of beans were sown on the 26th of May in rows 30 feet long and 30 inches apart, the peas being 2 inches apart in the rows.

The following are the yields of the different varieties when fit for market:—

No.	Name.	Fit for Use.	Colour.	Quality.	Dates and Yields.			Total.
					Aug. 16	Aug. 21	Aug. 28	
					Lb.	Lb.	Lb.	Lb.
6	Refugee "1,000 to 1"	Aug. 16	Green	Medium	7	8	5	20
3	Valentine	" 16	"	Good	8	7	5	20
1	Rustless Wax	" 16	Yellow	Very good	6	7	3	16
4	Early Refugee	" 16	Green	Medium	10	4	2	16
7	Bountiful	" 16	"	"	4	5	2	11
5	Stringless Green Pod	" 16	"	Poor	4	3	2	9
2	Wardwell's Kidney Wax	" 21	"	Good		5	4	9

BEETS.

Six varieties of beets were sown on the 16th of May in rows 30 feet long and 30 inches apart. The beets were thinned to 2 inches apart.

The following is the record kept of the different varieties:—

No.	Name.	Fit for Use.	Shape.	Quality.	Weight when pulled.
					Lb.
10	Black Red Ball	Aug. 7	Ball	Medium	32
13	Early Blood Red Turnip	" 7	Turnip	Good	31
11	Eclipse	" 7	Pointed	"	27
9	Ruby Dulcet	" 7	Round	"	25
8	Meteor	" 10	Turnip	"	24
12	Egyptian Dark Red	" 10	"	"	11

LETTUCE.

Ten varieties were planted on May 16 in rows 15 feet long. The plants were thinned to 6 inches apart and the weight of half of each row was recorded.

No.	Name.	Fit for Use.	Size of Head.	Quality.	Weight.
					Lb.
56	Giant Crystal Head	July 30	Large	Good	13
54	All Heart	" 30	Medium	"	11
52	Red Edge Victoria	" 30	"	Poor	10
53	Unrivalled Summer	" 30	"	Medium	8
59	Iceberg	" 30	Large	Good	8
62	Dark Green Capucine	" 30	Medium	Medium	8
60	Improved Hanson	" 30	"	Good	7
58	Crisp as Ice	" 30	"	"	7
55	Grand Rapids	" 30	"	Very good	6
57	Black Seeded Simpson	" 30	"	Poor	6

CARROTS.

Three varieties were planted on May 16 in rows 30 feet long and thinned to 1½ inches apart. These were weighed when pulled, giving the following results:—

No.	Name.	Fit for Use.	Shape.	Quality.	Weight when Pulled.
					Lb.
26	French Horn	Aug. 16	Short	Good	57
28	Half Long Chantenay	" 10	Medium	"	50
27	Improved Nantes	" 12	"	Medium	32

CUCUMBERS.

Five varieties were planted on June 7 in hills 5 by 4 and 6 feet apart. Of these, records were kept which are given below:—

No.	Name.	Fit for Use.	Weight per hill when picked.
			Lb.
47	Giant Pera	Sept. 5	25
51	Extra Early Russian	" 4	24
48	Peerless White Spine	" 8	21
50	Prize Pickling	" 5	13
49	Cool and Crisp	" 8	11

CORN.

Eleven varieties were planted on the 7th of June, but only two of the eleven developed enough for table use. These were Golden Bantam and Early Malcolm.

PARSNIPS.

Hollow Crown was the only variety planted, but yielded a very good crop.

PARSLEY.

Double Curled gave the best results.

PEPPERS.

Four varieties were planted in hotbeds on April 7. These were transplanted on April 10 and planted in the open on May 10, but none matured sufficiently to get records from.

SALSIFY.

Long White was the only variety tried, which gave very good results.

APPLES.

The apple crop was the lightest we have had for a number of years, and the fruit was of a very inferior quality. The latter was due no doubt to the lack of thorough pollination.

PLUMS.

The plum crop, on the other hand, was the best we have had for some time, especially the Blue and Yellow Gages.

NAPPAN.

PERENNIALS.

Three hundred and eighty varieties were grown. These, also, made good growth and there was a profusion of bloom which lasted throughout the flowering season.

The following are some of the varieties and their time of blooming:—

No.	Name.	When in Bloom.	
		From	To
1	Achillea sibirica	June 1	June 20
2	Bleeding Heart	" 18	July 20
3	Campanula Raineri	Aug. 2	Sept. 29
4	Delphinium	" 12	" 30
5	Echinacea	" 10	Oct. 20
6	Funkia		
7	Gaillardia	June 15	" 15
8	Helianthus	Aug. 1	" 2
9	Iris	June 15	July 20
10	Kniphofia	Aug. 30	Oct. 15
11	Lilium	" 15	Sept. 6
12	Mentha	" 6	" 6
13	Narcissus	May 15	June 10
14	Ononis	July 15	Aug. 10
15	Pæonies	June 1	June 30
16	Phlox	July 5	Sept. 20
17	Rudbeckia	June 1	Oct. 1
18	Salvia	Aug. 29	Sept. 22
19	Spiraea	July 25	Aug. 20
20	Trollius	June 1	July 3
21	Verbena	Aug. 26	Oct. 1

DAHLIAS.

Fifty-two varieties were planted in uniform soil, all of which gave a very strong growth and a profusion of bloom.

The following are twenty of the best varieties and their colours:—

No.	Name.	Colour.	Shape.
3	Excelsior	Crimson	Cactus.
4	Ethel Yeatman	Yellowish pink	"
6	Comedy	" brown	"
9	Great Western	Light scarlet	"
12	Crescent	Salmon	"
19	Success	Yellow	"
27	New Sarum	Orange	"
32	Vedette	Red	"
33	The Bride	White	"
37	Canadian	Pink	"
41	Primrose	Dark crimson	"
44	Glory of Wilts	Yellow	"
45	Manifesto	White	"
46	Mrs. A. Dyer	Yellow	"
49	Freyda	"	"
50	Dr. Kendal	Pink	"
51	Auburn Beauty	Yellow	"
59	Mrs. Pearce	White	Common
53	Chas. Turner	Scarlet	Cactus.
36	Electric	White	"

FLOWERS.

Practically all the annuals were sown in hotbeds about the 10th of April and by the middle of June they were ready to be transplanted out into the annual beds, which were prepared the previous fall.

The following is a list of the annuals grown and their time of blooming:—

No.	Name.	Date of Planting	Date of Transplanting.	No. Varieties Grown.	Length of Time in Bloom	Began to Bloom	Full Bloom.	Bloom Falling.	Height.
					Days.				
1	Asters	April 9	June 20	49	60	Aug. 15	Sept. 8	Oct. 15	2 feet.
2	Balsams	" 8	" 20	2	27	" 18	" 9	Sept. 14	1½ "
3	Candytuft	" 8	" 18	2	58	" 7	Aug. 20	" 3	8 inches.
4	Coreopsis	" 7	" 15	7	31	" 18	" 30	" 18	2 feet.
5	Cockscomb	" 8	" 24	1	31	" 10	" 29	" 10	1 "
6	Clarkia	" 8	" 23	1	26	" 17	Sept. 6	" 12	3 ½ "
7	Cosmos	" 8	" 20	1	40	" 21	" 13	" 30	1 "
8	Dimorphotheca	" 8	" 23	1	13	" 28	" 5	" 10	½ "
9	Godetia	" 7	" 18	2	26	" 20	" 6	" 15	1 "
10	Larkspur	" 7	" 20	3	45	" 16	" 14	" 30	1 "
11	Lobelia	" 8	" 23	2	31	" 20	" 12	" 20	36 inches.
12	Linaria	" 8	" 20	2	14	" 18	Aug. 24	" 1	9 "
13	Lupines	" 8	" 20	1	33	" 28	Sept. 8	" 22	3 feet.
14	Marvel of Peru	" 8	" 20	1	35	" 17	" 10	" 21	2 "
15	Nigella	" 8	" 20	1	29	" 27	" 10	" 25	1½ "
16	Marigold	" 7	" 20	1	47	" 14	" 13	" 30	2 "
17	Malope	" 7	" 12	2	28	" 18	" 7	" 15	3 "
18	Nemesia	" 7	" 20	5	32	" 20	" 10	" 21	8 inches.
19	Portulaca	" 8	" 20	1	31	" 20	" 3	" 20	2 "
20	Pansy	" 7	" 23	3	57	" 14	" 20	Oct. 10	6 "
21	Petunia	" 7	" 18	3	28	" 18	" 10	Sept. 15	2 feet.
22	Phlox	" 7	" 20	7	35	" 14	" 10	" 18	1 "
23	Swan River Daisy	" 8	" 18	1	22	" 17	" 2	" 8	9 inches.
24	Salvia	" 8	" 23	1	24	" 29	" 14	" 22	1 feet.
25	Scabiosa	" 12	" 18	6	26	" 25	" 7	" 20	2 "
26	Stocks	" 8	" 18	12	39	" 13	" 14	" 21	1 "
27	Salpiglossis	" 8	" 18	6	21	" 28	" 10	" 18	1½ "
28	Sweet Sultan	" 7	" 12	3	26	" 25	" 10	" 20	2 "
29	Verbena	" 7	" 18	7	36	" 14	" 7	" 19	1 "
30	Viola	" 7	" 12	5	21	" 17	" 2	" 7	6 inches.
31	Zinnia	" 12	" 20	6	40	" 20	" 18	" 29	2 feet.

SWEET PEAS.

Seventy-three varieties of sweet peas were planted and practically all made good growth, which resulted in a large amount of rich coloured bloom. The following is a list of twenty of the best varieties and their colours:—

No.	Name.	Colour.
162	Mrs. Routzahn Spencer	Pink.
166	Elsie Herbert	White rose.
170	Dobbie's Cream	Cream.
179	Flora Norton Spencer	Light blue.
182	King Edward	Crimson.
188	Mrs. Walter Wright	Rich rose.
193	Prince of Wales	Deep rose.
201	Othello Spencer	Maroon.
207	Frank Dolby	Lavender.
212	Elfrida Pearson	Salmon.
213	Etta Dyke	White.
227	Prince George	Lilac.
229	May Campbell	Carmine.
233	Earl Spencer	Salmon.
220	Tennant Spencer	Rosy mauve.
214	Clara Curtis	Primrose.
206	Flora Norton Spencer	Pale blue.
189	Black Knight	Chocolate.
195	Saint George	Orange scarlet.
199	Scarlet Monarch	Crimson scarlet.

GROUNDS.

During the past season considerable change has been made in the grounds. Some 2 acres of new lawn have been added, taking a small portion of the old orchard next the main road. On this a mixture of grasses and clovers was sown, made up as follows: 30 pounds Kentucky Blue grass, 15 pounds White or Dutch clover, 55 pounds Timothy.

An excellent catch was obtained and by next year we ought to have a nice lawn. Then, too, a number of shrubs were removed from the lawns, they being too thick and doing more damage than good.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR.

This is the second annual report of some of the work done in horticulture at this Station. It will be seen that progress has been made during the past season in extending the orchards, grading and planting the lawns, conducting trial tests with vegetables and flowers, and in starting a series of orchard experiments with fertilizers. In addition to this, orchard spraying experiments have been conducted at Berwick, Kings county; Falmouth, Hants county; and Bridgetown, Annapolis county. The results of some of the experiments conducted are given herewith.

The season was decidedly favourable for the development of scab, and on all unsprayed trees the percentage of diseased apples was very large. This was no doubt due to the trees coming into leaf early, followed by a long, cool, damp, period before blossoms were fully opened, which favoured the formation of scab on the foliage before the usual first spray before the blossoms were open, was applied; all sprays applied early, for this season at least, gave the best results.

WEATHER.

April was dull, with frequent warm spells. On the 26th, 82° is recorded. Rain occurred on fifteen, and light snows on seven days. The temperature averaged 3° above normal.

May was cool, with few bright days. Rain is recorded on nineteen days; the total precipitation was not, however, above the average. The temperature averaged 3° below normal.

The main average temperature from April 15 to May 1 was 47.93°; May 1 to May 16, 44.73°; May 16 to June 1, 47.97°. It will be seen that the latter half of April was slightly warmer than the latter half of May, and that the first half of May was three degrees, on the mean average, lower than the latter half of April. Thus the warm April forced the trees into foliage but, owing to the low temperature early in May, the growth was very slow until after the middle of the month. There was frost on the 16th, 17th, and 18th, when the thermometer registered 27°, 28°, and 28° respectively. This did considerable damage in some places to the varieties such as the Gravenstein, which blossom early, and were just commencing to open.

June was cool and cloudy, with very slight precipitation. The temperature averaged slightly below normal.

July was generally cool and cloudy, with the highest temperature during the first week. The precipitation was normal. The temperature averaged 1° below normal.

August was dry and warm. Rain is recorded on seven days, with total precipitation very light. The temperature averaged 1° below normal.

September was a seasonable month throughout. Rain fell on eleven days, but the total precipitation was less than the average. The temperature averaged 2° below normal.

October was an unusually wet month, rain was recorded on twenty days, with nearly 9.60 inches as the aggregate, or 20 per cent greater than normal. The temperature was unusually high, and averaged 9° above normal.

The first fall frost of 1° was recorded on October 1. The only other frost recorded for the month was on the 23rd, when the temperature fell to 32°. During the

first week in November, frost occurred every night, and 11° and 10° were recorded on the 3rd and 4th respectively.

November was fine and seasonable. Temperature slightly above normal, and precipitation about one-half of normal.

December was mild and pleasant weather, with snowfall of 13¾ inches. There was sleighing on Christmas day in some places.

There was sleighing in January from the 10th to the 24th. The snowfall totalled 16¼ inches.

Below zero was registered on the 1st, 14th, 19th, and 20th; the temperature being 1°, 1°, 2°, and 5° below zero respectively. The weather came in decidedly mild on the 24th and 25th, with a temperature of 47° and 50° respectively. This took off all the snow and thawed out the streams and ground. The latter part of the month was also mild, with considerable rain, and the month closed with deep mud on the roads.

The first week in February was seasonable, but during the following three weeks, from the 10th to the 27th, the weather was cold continuously. The thermometer went below zero on eight days. On the 11th, 12th 13th, 14th, 16th, 22nd, 24th and 25th, the lowest temperature was 6°, 14°, 9°, 7°, 1°, 17°, 10°, and 16° below zero respectively. During this period the winds were high and the frost penetrated buildings and cellars that had previously been considered frost proof. The ground was practically free from snow until the 15th, and as a result the ground was frozen to a great depth, and much inconvenience was caused in the town from water pipes, supposed to be below frost, freezing. There was fairly good sleighing from the 15th to the end of the month. The snowfall was 13 inches.

Six inches of snow fell in March, but there was little sleighing except during the first week. The brooks and streams thawed out early in March but the temperature remained low after the first week, and the frost came out very slowly and ice remained in the woods until well into April. The month was unusually cloudy, especially during the first two weeks, for which period 39.5 hours of sunshine is recorded.

METEOROLOGICAL RECORDS.

The mean average temperature, rainfall and hours of sunshine as recorded at the Experimental Station, Kentville, N.S., for the year commencing April, 1913, are as follows:—

	Mean Average Temperature.	Rainfall.	Sunshine.
	°	Inches.	Hours.
April	41·9	4·29	137·1
May	46·2	3·17	178·2
June	56·7	1·23	270·1
July	65·4	3·72	252·1
August	63·3	1·70	238·4
September	54·3	2·55	156·6
October	56·5	9·60	57·8
November	38·4	1·97	111·5
December	23·44	4·39	74·65
January	19·68	2·80	91·6
February	14·19	2·59	118·7
March	30·72	3·73	118·2

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PLANTATIONS MADE.

Orchard Planted in 1913.

Included in the varieties of fruits planted are 49 cherries, 60 pears, 78 plums, 37 peaches and 90 apples, of which two trees of a variety were set. Three hundred and fifty Wagener apple trees were planted as fillers, and 100 Gravenstein and 50 McIntosh were set in the main orchard. There were 120 trees planted for fertilizer experimental work, namely 30 Roxbury Russet (Nonpareil), 30 Ribston, 30 Stark and 30 Milwaukee. There were also planted 60 Wagener, including 10 each of the different grades of nursery trees sold by nurserymen, set out in order to get some information as to their relative value for commercial planting. For an experiment in close planting, 45 dwarf pears of three varieties, and 120 plums of four varieties, were set in a block already planted 20 by 20 feet apart, making the trees 10 by 10 feet apart; also 36 trees each of three varieties of cherries grafted on Mazzard stock and a duplicate lot grafted on Mahaleb stock were set to test the relative value of these as stocks to graft on; also, 60 trees, 30 each of Burbank and Giant Prune plum, using trees of different ages and grades, were planted, and 10 trees each of quince and apricot. The total number of trees set is 1,589, consisting of 860 apples, 336 plums, 165 pears, 134 cherries, 74 peaches, 10 apricots and 10 quinces. There are now approximately 33 acres planted to orchard.

Small Fruits and Grapes.

There were planted 31 varieties of grapes, 146 plants in all; 9 varieties of gooseberries, 6 plants of each; also 30 varieties, 6 of each, of currants; 16 varieties, 12 each, of blackberries; 8 varieties, 50 of each, of raspberries; and 10 varieties, 100 of each, of strawberries were set. These total 1,972 plants, and, with few exceptions, have made a good start.

Lawns and Planting Shrubs and Trees.

An area of about 5 acres in front of the farm buildings, which is hilly and more or less broken, has been partly put into lawns and planted with shrubs and trees. This land, for the most part, is of a sandy nature, and very poor.

An area of about 4 acres was worked up, graded and seeded to Kentucky Blue grass and white clover, using 50 pounds of the former and 3 pounds of the latter to the acre. The summer was dry and the grass made very poor growth, but during the fall, however, with unusual rains, the grass made a good growth, and a fair lawn will result. Complete fertilizer at the rate of 500 pounds per acre was sown broadcast and harrowed in before seeding.

The trees and shrubs sent from Ottawa for planting the grounds have, for the most part, made a good growth. The evergreens, in a good many cases, failed to grow and will have to be replaced.

The roads have been improved somewhat during the season. The heavy fall rains have washed the edges badly, and it seems desirable that cobblestone water-courses should be made along the hill road to prevent such erosion.

An avenue of sugar maples has been set part way along the central drive through the farm. These trees have been placed 40 feet apart.

A number of trial hedges have been planted for the purpose of getting additional information as to the most desirable sorts. The flowering plants from the seed sent from Ottawa made an excellent showing during the summer.

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VEGETABLES.

Tests were made of the various vegetables from seed supplied from the Experimental Farm, Ottawa. The land on which these were grown was poor and not very suitable for vegetables, and no large yields can be reported.

TOMATOES.

Forty-one varieties were tested. The variety Alacrity was the earliest, and this, together with the various strains of Earliana, is undoubtedly the best for this climate. The Bonny Best also gave good returns of ripe fruit. Six plants of each variety were planted June 7. These were started on April 7. The Alacrity produced, on the average, 7 pounds of ripe fruit per plant, and the various strains of Earliana 4½ pounds of ripe fruit per plant. The total yield of green and ripe fruit was, however, greater with the Earliana strains.

CABBAGE.

Twenty-five varieties of cabbage were tested. These were started April 8 and planted in the open ground on May 27. The best early variety tested was the Copenhagen Market, while Henderson's Succession was a good second early sort. Danish Roundhead is a very firm round variety, and a good keeper. Autumn King and Fottler's Improved Brunswick are excellent, large, late sorts.

LETTUCE.

Thirty varieties of lettuce were tested. These were started March 25 and planted in the field May 8. All-Heart, Giant Crystal, and Iceberg were considered the best cabbage-head varieties, and Grand Rapids and Black-seeded Simpson the best of the open-headed sorts.

PEAS.

Ten varieties of garden peas were sown. Gregory's Surprise was the earliest, followed by Excelsior, Thos. Laxton, and Gradus, all of which are good early sorts. For second early, Nott's Excelsior, Premium Gem, and McLean's Advancer. For Main crop, Telephone, Heroine, and Stratagem. For late crop, Juno and Admiral Dewey.

GARDEN BEANS.

Ten sorts of string beans were tested, of which Wardwell's Wax, Early Red Valentine, and Refugee or 1000 to 1, a very late sort, are the best.

SWEET CORN.

Fourteen varieties of garden corn were planted but made very inferior growth, due in part to the cool season. The earliest variety was the Early Malcolm, which was followed by Peep-o'-Day and Extra Early Cory.

MUSK MELONS.

Six varieties of musk melon were tested, and three strains of Montreal melon were also included in the trial, these were the Montreal Market, Decaric, and Gorman. The seed was sown in 3½-inch pots in the greenhouse on March 31. The plants were carried in these pots until May 22, when they were set from the pots to frames 6 by 12 feet in size covered with four 3 by 6-foot sashes. The plants should have been set out ten days earlier, but we were delayed in getting the frames ready.

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Eight plants were set to each frame, about 1 foot apart. The ground was prepared by making a trench about 1 foot deep and 1 foot wide and placing in this 6 inches of good heating horse manure. The soil was rounded over the trench, and after the frames had been closed for two days to warm up the soil the plants were set.

The frames were kept well ventilated during the day and closed at night until the first week in July, the plants were then gradually hardened off by lifting the frames and they were finally removed toward the end of July.

The fruit splits badly under our climatic conditions, which is no doubt caused by the great range between our night and day temperature. This splitting, of course, renders the fruit unmarketable and consequently the growing of this crop will probably never be of any commercial importance unless varieties are obtained that will not split.

The following table gives such information as we were able to secure in the growing of this crop:

	First fruit ripe.	Picked Aug. and Sept.		Number.	Yield Weight.		Average Weight per fruit.	
		Sound.	Split.					
					Lb.	Oz.	Lb.	Oz.
Paul Rose	Aug. 8	26	28	54	48	11½		14·2
Emerald Gem	" 7	72	8	80	62	6		12·5
Earliest Ripe	Sept. 2	32	6	38	24	12½		10·1
Hoodoo	" 4	38	16	54	26	9½		7·9
Hackensack	Aug. 3	14	15	29	53	15½	1	13·8
Montreal Market	Sept. 9	15	13	28	65	3½	2	5·3
Decarie	" 3	19	25	44	182	8	4	2·3
Gorman	" 10	10	13	23	74	14	3	4·1

CUCUMBERS IN THE GREENHOUSE.

Seven varieties of cucumber were grown in the greenhouse during the summer. Two of these, Arlington White Spine and Davis Perfect were American varieties and the other five were English sorts.

The seed was sown in 3½-inch pots on April 25. One plant was grown to a pot; and these were set from the pots to benches at a distance of 4 feet apart on June 3.

The soil was well enriched with well-rotted horse manure and bone meal. A dressing of horse manure was also given on July 22.

The vines were trained to a trellis with wires 1 foot apart and the laterals were allowed to spread on each wire 2 feet on each side of the main vine.

The house was well ventilated during the day and during very warm days was kept moist by wetting the paths and underneath the benches in order to give a humid atmosphere. This was generally well wet down at 4 o'clock and closed down for the night.

The American sorts were hand pollinated, which was done by removing the male flower and placing them in contact with the female blossoms.

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The following table gives such information as we were able to obtain:

Variety.	First fruit picked.	Number of fruits from two plants.		Total No. from two plants.	Average weight per fruit.
		July	August.		
					Lb. Oz.
Arlington White Spine	July 10	31	94	125	9·1
Davis Perfect	" 16	32	68	100	12·8
Lockie's Perfection	" 13	37	39	76	1 4·3
Rochford's Favorite	" 16	32	22	54	1 8·7
Veitch's Sensation	" 16	29	32	61	1 9·9
Marquis of Lorne	" 18	18	19	37	2 6·7
Telegraph	" 19	21	50	71	1 5

POTATOES.

Sixty plots of potatoes of 1/120 acre each, or two rows each 66 feet long and 33 inches apart, were planted on May 27. The land on which they were grown was a poor sandy loam. The previous crop on this land was buckwheat, which was ploughed under in the fall. The ground was ploughed again in the spring, worked up well, and fertilizer made up of 150 pounds of nitrate of soda, 250 pounds of acid phosphate, 250 pounds bone meal, and 150 pounds sulphate of potash sown broadcast at the rate of 800 pounds per acre, and harrowed in before planting.

The sets were cut two to three eyes to a piece and were planted 14 inches apart in a row. The crop suffered considerably from the dry weather during July and August, and the percentage of unmarketable tubers was very large. The crop was harvested on October 6 and 7.

Two plots were planted of Late Puritan, Gold Coin, Wee McGregor and Rawlings (Ashleaf). Kidney, with seed got from different sources, and also three plots of Carman No. 1, Irish Cobbler, Green Mountain, and Table Talk, with seed from different sources. The test included forty-eight varieties.

Variety.	Bushels marketable tubers per acre.	Bushels unmarketable tubers per acre.	Bushels total per acre.
1. Rawlings (Ashleaf) Kidney O-B	204	34	238
2. Morgan Seedling C.	198	34	232
3. Manistee O-H.	200	30	230
4. Early White Albino O-J.	196	32	228
5. Late Puritan C.	184	32	216
6. Green Mountain C.	180	34	214
7. Clark's No. 1 C.	184	30	214
8. Wee McGregor O-IH.	176	32	208
9. Vick's Extra Early C.	178	28	206
10. New Queen O-Di.	174	32	206
11. Table Talk O-L.	158	48	206
12. Rawlings (Ashleaf) Kidney C.	164	32	196
13. Bovee O-A.	160	36	196
14. Clyde O-J.	162	34	196
15. Empire State C.	166	28	194
16. Wee McGregor C.	166	28	194
17. Irish Cobbler O-Di.	160	34	194
18. Dalmeny Hero O-W.	138	50	188
19. Gold Coin C.	158	30	188
20. Table Talk O-B	130	56	186
21. Houlton Rose O-Di.	138	46	184
22. Rochester Rose C.	136	44	180
23. Tab e Talk C.	118	60	178
24. McIntyre C.	128	48	176
25. Irish Cobbler C.	144	32	176
26. Snow J-O-J.	140	26	166
27. Carman No. 1 O-J.	134	28	162
28. Delaware O-J.	134	28	162
29. Conquering Hero O-W.	94	66	160
30. Gold Coin O-J.	130	28	158
31. Rural New Yorker C.	134	22	156
32. Up-to-Date O-D.	126	30	156
33. Burbank C.	134	20	154
34. Acquisition O-S.	102	50	152
35. Todd's Wonder O-H.	132	18	150
36. Pan American O-H.	124	26	150
37. New Scotch Rose O-A.	116	32	148
38. Early Norther O-Di.	120	26	146
39. Burpee's Extra Early O-Bu.	112	32	144
40. Eureka Extra Early O-Bu.	96	46	142
41. Silver King O-H.	116	26	142
42. American Wonder C.	124	18	142
43. The Scott O-K & B.	110	30	140
44. Carman No. 1 O-A.	120	20	140
45. American Wonder O-A.	118	18	136
46. Scottish Triumph O-K & B.	96	38	134
47. Sir Walter Ra'eigh O-H.	106	26	132
48. Dreer's Standard C.	110	20	130
49. Green Mountain 1837 O-J	100	24	124
50. Everett C.	100	23	123
51. Early Hebron O-D.	96	26	122
52. Carman No. 1 C.	94	22	116
53. Irish Cobbler O-B.	88	20	108
54. Late Puritan O-B.	86	20	106
55. Dobbie's Prolific O-D.	80	26	106
56. Early May O-H.	72	26	98
57. Green Mountain 1837 O-J	64	24	88
58. Early Ohio O-Ont.	60	22	82
59. Early Rose O-H.	56	20	76
60. Factor O-D.	42	26	68

Similar varieties of potatoes from different sources tested in 1913:

	Bushels Marketable per acre.	Bushels Unmarketable per acre.	Bushels Total per acre.
Carman No. 1, O-J...	134	28	162
" " O-A.	120	20	140
" " C...	94	22	116
Irish Cobbler O-Di.	160	34	194
" C.....	144	32	176
" O-B.	88	20	108
Green Mountain C.....	180	34	214
" 1838 O-J.	100	24	124
" 1837 O-J.	64	24	88
Table Talk O-L.	158	48	206
" C....	118	60	178
" O-B.	130	56	186
Gold Coin C..	158	30	188
" O-J.	130	28	158
Late Puritan C.....	184	32	216
" O-B	86	20	106
Wee McGregor O-I-H.	176	32	208
" C.....	166	28	194
Rawlings' Kidney, (Ashleaf Kidney) O-B.	204	34	238
" " " C...	164	32	196

FERTILIZER EXPERIMENTS WITH TOMATOES IN THE GREENHOUSE.

In order to determine something of the fertility of the virgin soil and the relative influence of the different plant food constituents when applied in the form of chemical fertilizers, a series of tests was started in the greenhouse.

The soil used was a sandy loam which had not previously been cropped, it having been taken from a field that was broken up out of green spruce and birch stumps the previous season. The bench was filled with this soil to a depth of 5 inches, the soil well worked over and pieces of roots removed and thoroughly mixed so that it was uniform in every particular. The area occupied by each plot was 2 square yards.

The respective plots were fertilized with the following amounts per acre. This was thoroughly mixed with the soil by hand.

	Lbs.
No. 1—	
Nitrate of Soda	150
Sulphate of potash	150
Acid phosphate	300
Total	600
No. 2—	
Nitrate of soda	300
Sulphate of potash	300
Acid phosphate	600
Total	1,200
No. 3—	
Nitrate of soda	300
No. 4—	
Nitrate of soda	300
Sulphate of potash	300
Total	600

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FERTILIZER EXPERIMENTS WITH TOMATOES IN THE GREENHOUSE.—*Continued.*

No. 5—

Nitrate of soda	300
Acid phosphate	600
Total	900

No. 6—
Check, no fertilizers.

No. 7—

Nitrate of soda	300
Sulphate of potash	150
Acid phosphate	300
Total	750

No. 8—

Nitrate of soda	150
Sulphate of potash	300
Acid phosphate	600
Total	1,050

No. 9—

Nitrate of soda	300
Sulphate of potash	300
Acid phosphate	600
Total	1,200

Livingston's Globe tomato plants were planted 18 inches apart, and each plot contained nine plants.

The seed for these was sown on July 9. They were transplanted into 3-inch pots on July 28, and shifted to 4½-inch pots on August 9. They were set into the permanent bench on August 26. The first ripe fruit was picked from plots Nos. 1, 2, 4, 8, and 9 on November 17; plots Nos. 5, 6, and 7 on November 24; and plot No. 3 on November 27. The plants were lifted and weighed on the 24th January, 1914. The yield from these plots is given in the following table:—

YIELD OF FRUIT per plot of 2 square yards.

	Yield November.		Yield December.		Yield January.		Yield of green fruit on plants Jan. 24.		Total Yield from plants.	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
No. 1	1	10	5	9	2	2		13	10	2
" 2	2	10	4	13	3	15	1	4	12	10
" 3		12	5	2	2	11	1	8	10	1
" 4	1	8	4	8	3	9	1	7	11	
" 5	2	2	5	4	6		1	3	14	9
" 6	1		3	7	3	7		8	7	15
" 7	2	5	4	13	1	15	1	13	10	14
" 8	1	13	6		3	6	1	3	12	6
" 9	2	14	6		6	8	2	1	17	7

As already stated, the plants were lifted, all earth shaken off and the plants weighed from each plot. Notes were also taken as to the character of the foliage. It had a noticeable unhealthy purplish colour, and in some cases had died, the green matter disappearing from it with a consequent drying up. The different plants were measured and the average height of the nine plants is given.

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WEIGHT AND CHARACTER of plants when dug up.

Plot.	Average Height of plant.		Colour of foliage.	Dead leaves.	Weight of plants.	
	Feet.	Inches			Lb.	Oz.
No. 1	5		Medium Purple.	18	5	..
" 2	5	7	Slight "	11	6	4
" 3	4	3	Medium "	33	4	1
" 4	4	2	Slight "	24	4	5
" 5	4	7	Medium "	21	5	8
" 6	4		Very "	56	3	8
" 7	4	5	Medium "	34	4	5
" 8	4	9	Very "	56	5	3½
" 9.	5	..	Very "	42	5	9

It will be noticed that plot 3, where nitrate of soda was used shows only 9 ounces gain in growth over the check plot. Also it will be seen that the gain in fruit is only 2 pounds, 2 ounces over the check plot. Where nitrate of soda and sulphate of potash was used on plot 4 there is a gain of only 13 ounces in growth over the check plot; also the gain in fruit is only 3 pounds 1 ounce. On plot 5, where acid phosphate and nitrate of soda were used there was a gain of 2 pounds in growth over the check plot, and a gain in fruit of 6 pounds 10 ounces over the check plot. Since there is little gain from the nitrate of soda in plot 3, we may fairly assume that acid phosphate has been largely responsible for the increased yield. In all cases where the acid phosphate has been increased there has been an increased growth and increased crop. It would appear that our soils are principally deficient in phosphorus.

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EXPERIMENTS WITH GROUND LIMESTONE IN THE GREENHOUSE.

A sample of ground limestone was received from the Eastern Lime Co., Sydney, N.S., and in order to test its value on our soil a series of small areas was limed at the rate of 3,000 pounds per acre, and duplicate plots left untreated.

The results given are from half a square yard, and are sufficiently striking to indicate that lime, together with phosphorus in some form is necessary to produce satisfactory results with some crops. The data secured were with a crop of spinach.

The soil used in this test was from a newly broken-up field area not previously cropped.

Plot. 1.	Per acre.	Limed 3,000 Lb. per acre.	Not Limed.
	Lb.	oz.	oz.
Nitrate of Soda	150		
Sulphate of potash	150		
Acid phosphate	300	14¾	4
Plot 2.			
Nitrate of soda	300		
Sulphate of potash	300		
Acid phosphate	600	17	3
Plot 3.			
Nitrate of soda	300	2¼	¾
Plot 4.			
Nitrate of soda	300		
Sulphate of potash	300	2¾	1
Plot 5.			
Nitrate of soda	300		
Acid phosphate	600	12	2½
Plot 6.			
Check, no fertilizers		2	½

Of particular interest is the result obtained from nitrate of soda alone at the rate of 300 pounds per acre, which is very little better than the check plot, and also the plot where nitrate of soda and sulphate of potash were used, which was but slightly better than the check plot. These plots, as compared with plot 5, where nitrate of soda and acid phosphate were used, indicate that acid phosphate together with lime gave the best results, and that acid phosphate without the lime did not materially increase the crop.

The illustration shows the spinach plots about one-half grown. The plots commence with number one at the farther end of the bench. The space between the stakes across the bench was given commercial fertilizer evenly spread over the whole area. Lime was applied and worked into the soil in which the three rows to the right of the illustration are growing. No lime was applied to the soil in which the three rows to the left are growing.

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FERTILIZER EXPERIMENTS WITH FRUIT TREES, COVER CROPS AND INTERMEDIATE CROPS.

In order to test the relative value of different fertilizers for growing apple trees and intermediate crops, a series of tests was started in the spring of 1913. The object of this experiment is principally to determine what fertilizers or combination of fertilizers are most desirable for producing trees which will come into profitable bearing in the shortest time.

Cover crops of vetch will be sown on the area occupied by the trees, which area will be increased year by year as the trees grow. The effect of these fertilizers on the cover crop will be noted and the data as to the relative value of different combinations for a leguminous cover crop determined.

Since young orchards occupy little of the land during their early growth, it is considered advisable to grow intermediate crops between the trees. It has been thought that a good orchard rotation for the land not occupied by the trees is grain, clover, potatoes. This offers a practical three years' rotation which should prove satisfactory to the average orchardist.

The intention is to use the fertilizers in the same proportions and same quantities each year until such time as the growth of trees or crops may show that fertilizers are being used to excess.

The effect of the different fertilizers will be noted on the intermediate crops. It will be seen that the experiments are three-fold: First, to determine growth and ultimate fruitfulness under the influence of different fertilizers; second, effect of fertilizers on the cover crop; third, quality and quantity of intermediate crops on the differently fertilized plots. It is the intention to continue these tests for a period of ten to fifteen years, or longer as may be thought desirable. The varieties of apple trees in this test are Gravenstein, with Wagener as fillers. The Gravensteins are set 40 by 40 feet apart, and the Wagener set one way between the trees making the rows 20 feet apart one way and 40 feet the other.

The following table gives the quantity of fertilizer used per acre, and the yield of potatoes during the past season on the various plots as calculated from plots of one-fortieth acre each. The variety Green Mountain was planted.

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FERTILIZER EXPERIMENT with Potatoes.

	Per acre.	Marketable Bushels per acre.	Unmarketable Bushels per acre.	Total Bushels per acre.
Plot 1.	Lb.			
Nitrate of soda	150			
Acid phosphate	350			
Sulphate of potash	150	179½	34	213½
Plot 2.				
Nitrate of soda	150			
Basic slag	500			
Sulphate of potash	150	169	33	202
Plot 3.				
Nitrate of soda	150			
Bone meal	500			
Sulphate of potash	150	221½	29½	251
Plot 4.				
Sulphate of ammonia	150			
Acid phosphate	350			
Sulphate of potash	150	259½	35	294½
Plot 5.				
Nitrate of soda	150			
Acid phosphate	350			
Sulphate of potash	100	172½	37	209½
Plot 6.				
Check, no fertilizer		122	29	151
Plot 7.				
Nitrate of soda	150			
Acid phosphate	350			
Sulphate of potash	150	221½	29	250½
Mixed and applied at the rate of 400 pounds per acre.				
Plot 8.				
Nitrate of soda	150			
Acid phosphate	350			
Sulphate of potash	150	237½	25½	263
Mixed and applied at the rate of 600 pounds per acre.				
Plot 9.				
Nitrate of soda	150			
Acid phosphate	350			
Sulphate of potash	60	213	40½	253½
Plot 10.				
Nitrate of soda	150	183	32	215
Plot 11.				
Check, no fertilizer		123	28½	151½
Plot 12.				
Nitrate of soda	150			
Acid phosphate	350			
Sulphate of potash	150	252½	32½	285
Mixed and applied at the rate of 800 pounds per acre.				

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FERTILIZER EXPERIMENT with Potatoes. *Concluded.*

	Per Acre.	Marketable Bushels per acre.	Unmarketable Bushels per acre.	Total bushels per acre.
Plot 13.				
Nitrate of soda	150			
Acid phosphate	350			
Sulphate of potash	30	164	33½	197½
Plot 14.				
Check, no fertilizers		122	32½	154½
Plot 15.				
Sulphate of potash	150	136½	26	162½
Plot 16.				
Nitrate of soda	150			
Acid phosphate	350			
Muriate of potash	150	237	28½	265½
Plot 17.				
Acid phosphate	350	150½	36	186½
Plot 18.				
Bone meal	500	202½	31½	234
Plot 19.				
Check, no fertilizer		161½	25½	187
Plot 20.				
Acid phosphate	350			
Sulphate of potash	150	162	33½	195½
Plot 21.				
Basic slag	500	160	34½	194½
Plot 22.				
Nitrate of soda	150			
Basic slag	500	196½	35½	232
Plot 23.				
Nitrate of soda	150			
Sulphate of potash	150	195	28½	223½
Plot 24.				
Nitrate of soda	150			
Acid phosphate	350	165½	35	200½

FERTILIZING YOUNG TREES AT PLANTING TIME.

In order to determine whether commercial fertilizers can be used to advantage at planting time to give the tree a better start, and also to determine whether such fertilizers, if applied in large quantities, would cause injury to the tree, a series of experiments were started using Ribston, Milwaukee, Stark, and Roxbury Russet (Nonpareil) apple trees 2 years old, of uniform grade from the same source. Two trees of each variety were used in an experiment and fifteen experiments, as follows, were

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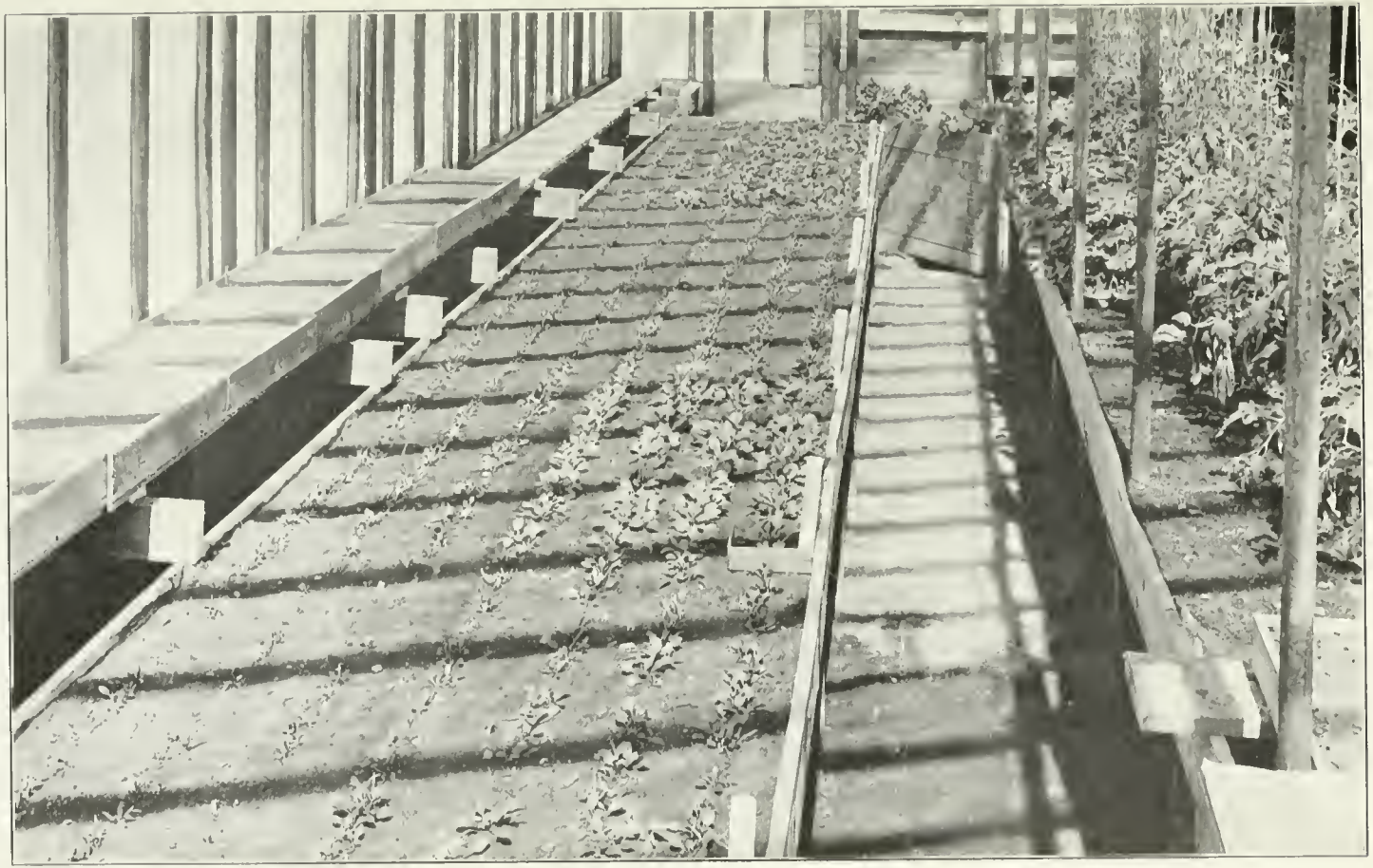

Fertilizer Experiments with Spinach. Three rows next to stakes treated with lime. Three rows at the back of the bench not treated. Plots run across bench commencing at the further end of the bench with plot 1. Plants out half grown.

conducted. The per cent of trees giving strong, medium and weak growth during the season, an average for all the varieties, is also given.

It will be seen that there is an apparent injury from using large quantities mixed into the soil in that the growth on these plots was not as strong as that on the plots not so treated. It will be noticed also that where large quantities were spread on the surface and worked in shallow the growth was better than when it was mixed with the soil at planting time. It would appear that moderate applications may be used to some advantage. These trees will not be fertilized next spring and notes will be taken as to their growth next season.

	Per cent strong growth.	Per cent medium growth.	Per cent weak growth.
No. 1, 600 pounds per acre spread on surface after planting and worked in to a depth of 3 inches	12·5	62·5	25
No. 2, 1,200 pounds per acre spread on surface after planting and worked in to a depth of 3 inches		62·5	37·5
No. 3, 1,800 pounds per acre spread on surface after planting and worked in to a depth of 3 inches		62·5	37·5
No. 4, 2,400 pounds per acre spread on surface after planting and worked in to a depth of 3 inches		50·0	50·0
No. 5, 3,000 pounds per acre spread on surface after planting and worked in to a depth of 3 inches		75·0	25·0
No. 6, 600 pounds per acre mixed in the soil dug out for planting the tree		87·5	12·5
No. 7, 1,200 pounds per acre mixed in the soil dug out for planting the tree		50·0	50·0
No. 8, 1,800 pounds per acre mixed in the soil dug out for planting the tree		37·5	62·5
No. 9, 2,400 pounds per acre mixed in the soil dug out for planting the tree		12·5	87·5
No. 10, 3,000 pounds per acre mixed in the soil dug out for planting the tree		12·5	87·5
No. 11, Nitrate of Soda, 600 pounds per acre spread on surface after planting and worked in to a depth of 3 inches		37·5	50·0
No. 12, Nitrate of Soda, 1,200 pounds per acre spread on surface after planting and worked in to a depth of 3 inches		50·0	50·0
No. 13, Check, no fertilizer		62·5	37·5
No. 14, Manure, 6 pounds per tree at rate of 15 tons per acre worked into soil after tree was planted		62·5	37·5
No. 15, Manure, 6 pounds per tree at rate of 15 tons per acre worked into soil dug out for planting the tree	12·5	50·0	37·5

EXPERIMENTAL ORCHARD WORK.

There are no bearing apple trees at this Station except a few scattered, uneven ones along the base of the hills on land very broken and difficult to get at, consequently it has been found advisable to select one orchard at Berwick, Kings county, one at Bridgetown, Annapolis county, and one at Falmouth, Hants county, for orchard experimental work. Spraying experiments for the purpose of getting definite information as to what spray mixture will control the apple scab best and give the largest percentage of first-grade fruit have, for the most part, occupied our attention during the past season. The experiments were duplicated as far as possible in the different orchards. Orchards with trees as uniform as possible were selected, and these were divided into plots of six trees each. All trees in a comparative test were given similar treatment other than spraying, thus eliminating possible error.

The experimental work at Berwick and Falmouth, was conducted by J. M. Robinson, B.S.A., Assistant for Horticulture, Experimental Station, Kentville, and at

Bridgetown by M. B. Davis, B.S.A., now assistant in Pomology to the Dominion Horticulturist, Experimental Farm, Ottawa.

For the purpose of explanation of the terms in the following tables a few words are necessary.

As there was a great difference in the degree of both scab and russet on the fruit in these experiments, three divisions were made in each, and we have slightly, medium, and badly scabbed, and slightly, medium, and badly russeted fruit recorded.

All apples on which were found very minute scabs on the side, or with small scabs at the calyx end, which did not materially affect the appearance of the fruit, were classed as slightly scabbed, those apples having scabs which were easily noticeable and which injured the appearance, but which did not cause cracking of the fruit, were classed as medium scabbed, while those apples which were cracked by the fungus, or half or more covered with the scabs, were classed as badly scabbed.

In russeting practically the same rule applied, and apples were classed as badly russeted when cracked or much blackened, as medium russeted when slightly blackened or roughened, and as slightly russeted when the russet was visible but not definite enough to in any way affect the appearance or market value of the fruit.

All scabby apples were graded in these experiments as No. 3 and in our opinion this is where they should be placed, but in ordinary packing the apples classed by us as slightly scabbed would have for the most part graded as No. 1. This fact will make our per cent of No. 1 and No. 2 fruit seem small and a comparison between our per cents and those which are obtained where No. 1 and No. 2 do not embody only strictly clean fruit will not be fair.

PLAN OF EXPERIMENT, Berwick Orchard—Section A—Gravenstein.

Plot.	A. — April 28.	1st. — May 17 before blossoms open.	2nd. — June 6 after petals fall.	3rd. — June 20.	4th. — July 9.	5th. — July 18.
No. 1	Bordeaux	Bordeaux	Bordeaux	Bordeaux	Bordeaux	
" 2	"	"	"	"		
" 3		"	"	"	Bordeaux	Bordeaux
" 4	L-Sulphur	L-Sulphur	L-Sulphur	L-Sulphur	L-Sulphur	
" 5	"	"	"	"		
" 6						
" 7		L-Sulphur	L-Sulphur	L-Sulphur	L-Sulphur	L-Sulphur
" 8		"	"	"	"	
" 9		Bordeaux	Bordeaux	Bordeaux	Bordeaux	
" 10		"	"	"		
" 11		"	"	L-Sulphur	L-Sulphur	
" 12		"	"	"	Bordeaux	
" 13		"	L-Sulphur	"	"	
" 14		L-Sulphur	"	"	"	
" 15		"	"	Bordeaux	"	
" 16		"	"	L-Sulphur		
" 17		Bordeaux	"	Bordeaux	L-Sulphur	
" 18		L-Sulphur	"	L-Sulphur	"	
" 19						
" 20		L-Sulphur	L-Sulphur	L-Sulphur.	L-Sulphur	

Plot 18 received no arsenate in the fifth application, and in plot 20 no arsenate of lead was used in the fourth and fifth applications. Sherwin-Williams arsenate of lead was used in all the other spray mixtures at the rate of 5 pounds to 100 gallons. The Niagara brand lime sulphur was used. The spraying mixture tested 1·009 specific gravity or approximately 1 gallon concentrated lime sulphur to 40 gallons water. Bordeaux made according to the usual formula, 4 pounds copper sulphate, 4 pounds lime, and 40 gallons water was used.

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SPRAYING EXPERIMENTS in the Berwick Orchard.

Plot.	How Sprayed.	Per cent by Wt. No. 1 and 2.	Per cent Russet Medium	Per cent Russet Bad	Per cent Russet Total	Per cent Scab Medium	Per cent Scab Bad.	Per cent Scab Total.
1	Ba—B. 1. 2, 3, 4 ..	59·15	39·25	43·02	98·45	5·55	4·22	19·97
2	B a—B, 1, 2, 3....	52·78	49·32	21·60	93·71	9·87	5·27	32·82
3	B, 1, 2, 3, 4, 5	50·94	53·66	28·04	98·37	12·81	7·92	40·44
4	L-S a, L-S, 1, 2, 3, 4	73·33	2·46	0·00	48·96	4·17	2·43	25·00
5	L-S a, L-S, 1, 2, 3..	81·49	0·09	0·09	65·12	1·78	0·54	10·70
6	Check, no Spray..	4·07	0·00	0·00	11·43	28·99	38·45	97·83
7	L-S, 1, 2, 3, 4, 5...	77·63	1·25	0·00	47·00	3·83	2·65	16·70
8	L-S, 1, 2, 3, 4....	64·29	1·76	0·00	55·54	7·25	4·31	32·56
9	B, 1, 2, 3, 4	43·33	40·75	25·69	83·22	7·91	4·45	38·01
10	B, 1, 2, 3..	36·33	50·00	24·02	93·14	11·27	7·84	46·07
11	B, 1, 2; L-S, 3, 4..	46·36	50·00	16·45	85·34	11·40	7·17	49·51
12	B, 1, 2; L-S, 3; B, 4.	39·19	45·70	14·71	83·85	14·06	9·90	54·68
13	B, 1; L-S, 2, 3; B, 4	65·13	41·63	1·13	73·42	7·60	4·92	33·05
14	L-S, 1, 2, 3; B, 4..	63·16	24·68	0·00	72·73	2·60	5·19	37·66
15	L-S, 1, 2; B, 3, 4..	60·80	58·66	12·11	92·90	4·60	5·84	24·71
16	L-S, 1, 2, 3.....	48·00	6·85	0·00	59·82	13·24	5·48	49·47
17	B, 1; L-S 2; B 3; L-S 4	52·53	57·31	3·01	91·78	15·03	7·61	44·85
18	L-S, 1, 2, 3, 4	76·86	8·66	0·00	59·74	9·52	8·44	44·10
19	Check, no Spray..	0·00	0·00	0·00	20·00	22·00	64·00	100·08
20	L-S, 1, 2, 3, 4...	50·79	19·77	0·00	81·92	14·13	10·73	49·59

PLAN OF EXPERIMENT, Section "E" Falmouth Orchard.

Plot.	1st Spray May 9.	2nd Spray before blossoms open May 20-21.	3rd Spray after petals fell June 11-12.	4th Spray June 23-24	5th Spray July 14.
No. 9	L-Sulphur	L-Sulphur	L-Sulphur	L-Sulphur	
" 10	"	"	"	"	L-Sulphur
" 11.	"		"	"	
" 12	Check no Spray				
" 13	L-Sulphur		L-Sulphur	L-Sulphur	L-Sulphur
" 14		L-Sulphur	"	"	
" 15			"	"	L-Sulphur
" 16		L-Sulphur	"	Bordeaux	Bordeaux
" 17.		Bordeaux	"	L-Sulphur	"
" 18.		"	"	Bordeaux	"
" 19.	Check, no Spray				
" 20.		Bordeaux	L-Sulphur	Bordeaux	
" 21..		"	"	"	L-Sulphur
" 22		"	Bordeaux	L-Sulphur	"

Niagara brand lime-sulphur 1·009 specific gravity. Bordeaux 4-4-40 and arsenate of lead at the rate of 5 pounds to 100 gallons was used in these sprays.

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SPRAYING EXPERIMENTS in Falmouth Orchard.

Plot	How Sprayed.	Per cent No. 1 and 2 by Wt.	Per cent Russet Medium	Per cent Russet Bad	Per cent Russet Total	Per cent Scab Medium	Per cent Scab Bad	Per cent Scab Total
	GRAVENSTEIN.	No						
9	L-S, 1, 2, 3, 4	fruit						
10	L-S, 1, 2, 3, 4, 5	94·68	0·00	0·00	37·21	0·98	0·00	3·52
11	L-S, 1, 3, 4	85·65	0·08	0·00	25·18	0·55	0·00	4·88
12	No spray	11·25	0·00	0·00	17·82	46·87	7·26	87·15
13	L-S, 1, 3, 4, 5	79·39	0·19	0·00	27·85	3·59	0 11	15·85
14	L-S, 2, 3, 4	64·93	0·00	0·00	12·89	6·29	0·00	20·51
15	L-S, 3, 4, 5	5·13	0·00	0·00	33·92	43·86	19·30	83 63
16	L-S, 2, 3; B, 4, 5	No fruit						
17	B, 2; L-S, 3, 4; B, 5	71·43	35·37	1·22	100·00	4·88	0·00	6·10
18	B, 2; L-S, 3; B, 4, 5	No fruit						
19	No spray	21·57	0·00	0·00	48·02	45·69	4·20	75·76
20	B, 2; L-S, 3; B, 4	78·02	58·75	1·76	96·81	0·00	0·00	11·99
21	B, 2; L-S, 3; B, 4; L-S, 5	92·13	67·17	0·43	96·33	1·08	0·00	6·91
22	B, 2, 3; L-S, 4, 5	80·95	61·70	5·28	96·98	1·51	0·00	8·68

Plot	How Sprayed.	Per cent No. 1 and 2 By Wt.	Per cent Russet Medium	Per cent Russet Bad	Per cent Russet Total	Per cent Scab Total
	GOLDEN RUSSET.					
9	L-S, 1, 2, 3, 4	90·00	0·00	0·00	0·00	4·83
10	L-S, 1, 2, 3, 4, 5	94·25	0·00	0·00	0·00	4·53
11	L-S, 1, 3, 4	89·48	0·00	0·00	0·00	5·24
12	No Spray	36·96	0·00	0·00	0·00	60·79
13	L-S, 1, 3, 4, 5	86·49	0·00	0·00	0·00	9·80
14	L-S, 2, 3, 4	71·90	0·00	0·00	0·00	24·71
15	L-S, 3, 4, 5	70·59	0·00	0·00	0·00	30·00
16	L-S, 2, 3; B, 4, 5	85·20	0·00	2·43	2·43	6·52
17	B, 2; L-S, 3, 4; B, 5	87·28	0·00	0·41	0·41	11·97
18	B, 2; L-S, 3; B, 4, 5	80·68	0·00	6·42	6·42	12·01
19	No Spray	45·22	0·00	0·00	0·00	51·06
20	B, 2; L-S, 3; B, 4	No fruit.				
21	B, 2; L-S, 3; B, 4; L-S, 5	68·71	0·00	5·75	5·75	24·44
22	B, 2, 3; L-S, 4, 5	78·72	0·00	1·53	1·53	15·31
	SPY.					
11	L-S, 1, 3, 4	88·55	0·00	0·00	10·09	2·30
12	No Spray	34·67	0·00	0·00	·31	62·81
13	L-S, 1, 3, 4, 5	79·81	0·00	0·00	5·80	13·09
15	L-S, 3, 4, 5	25·73	0·00	0·00	3·48	65·68
20	B, 2; L-S, 3; B, 4	76·67	18·18	0·00	49·49	13·13
21	B, 2; L-S, 3; B, 4; L-S, 5	86·09	10·13	0·27	37·07	7·20
22	B, 2, 3; L-S, 4, 5	81·68	15·76	0·88	54·93	6·78

SPRAYING EXPERIMENTS IN THE BRIDGETOWN ORCHARD.

The first spray used tested 1·01, the second 1·0095 and the third and fourth, 1·009 specific gravity. Niagara brand lime-sulphur was used.

The Bordeaux mixture was made according to the usual formula (i.e.) 4 pounds copper sulphate, 4 pounds lime, and 40 gallons water. Arsenate of lead at the rate of 6 pounds for 100 gallons was used in all the sprays.

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PLAN OF ORCHARD EXPERIMENT, Bridgetown.

Plot.	1st Spray before blossoms open May 12.	2nd Spray after blossoms fell, June 9.	3rd Spray June 20.	4th Spray July 3.
No. 1	Bordeaux	Lime-Sulphur	Bordeaux	Bordeaux
" 2	Lime-Sulphur	Lime-Sulphur	Bordeaux	Bordeaux
" 3	Lime-Sulphur	Lime-Sulphur	Lime-Sulphur	Lime-Sulphur
" 4	Bordeaux	Bordeaux	Bordeaux	Bordeaux

ORCHARD SPRAYING EXPERIMENTS, Bridgetown.

Plot.	How Sprayed.	Per cent No. 1 and 2.	Per cent Russet Bad.	Per cent Russet Total	Per cent Scab Medium	Per cent Scab Bad.	Per cent Scab Total.
	GRAVENSTEIN.						
1	B, 1; L-S, 2; B, 3, 4	50·7	31·3	62·6	14·5	9·9	49·3
2	L-S, 1, 2; B, 3, 4	41·6	20·0	34·7	18·5	14·2	58·4
3	L-S, 1, 2, 3, 4	48·3	5·5	25·8	14·0	9·6	51·6
4	B, 1, 2, 3, 4	54·5	42·9	78·2	8·9	8·7	45·5
5	Check, no Fruit						
	KING.						
1	B, 1; L-S, 2; B, 3, 4	72·3	45·7	68·7	0·7	0·25	13·85
2	L-S, 1, 2; B, 3, 4	69·4	55·8	73·1	3·4	0·8	23·0
3	L-S, 1, 2, 3, 4	82·5	5·8	18·6	0·7	0·0	17·0
4	B, 1, 2, 3, 4	71·2	60·8	71·2	0·6	0·0	13·7
5	Check, no Spray	2·4	0·0	1·1	30·9	33·5	97·3
	BEN DAVIS.						
1	B, 1; L-S, 2; B, 3, 4	72·2	77·0	87·6	4·4	0·7	5·1
2	L-S, 1, 2; B, 3, 4	72·6	67·2	92·4	0·7	1·6	12·0
3	L-S, 1, 2, 3, 4	58·6	47·3	58·8	6·1	6·5	24·5
4	B, 1, 2, 3, 4	41·4	63·1	69·6	0·5	11·8	26·3
	NONPAREIL.						
1	B, 1; L-S, 2; B, 3, 4	74·2	29·4	57·2	1·6	0·5	13·3
2	L-S, 1, 2; B, 3, 4	89·0	18·0	36·1	1·0	0·0	10·7
3	L-S, 1, 2, 3, 4	88·9	12·9	37·6	0·8	1·0	8·9
4	B, 1, 2, 3, 4	73·3	31·2	56·2	0·6	0·7	8·5

BORDEAUX VS. LIME-SULPHUR SUMMARY.

Lime-sulphur has of late years been gradually taking the place of Bordeaux as a suitable mixture with which to control apple scab. Bordeaux mixture has given good results in combating this disease but on account of causing objectionable russeting on the fruit, and decided foliage injury, it is not for this section at least a satisfactory spray.

The results obtained would indicate that for the control of apple scab, lime-sulphur is equally as effective as Bordeaux. the foliage was much healthier in all the plots where lime-sulphur alone was used, and the fruit in every case was much brighter and

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letter in appearance. The following table gives some of the results from using these two spraying materials, and is an average from the plots sprayed.

	p.c. Russet medium.	p.c. Russet bad.	p.c. Scab medium.	p.c. Scab bad.
Bordeaux	40·75	25·69	7·91	4·45
Lime-sulphur	1·76	0·00	7·25	4·31
No spray	0·00	0·00	28·99	38·45

The Gravenstein was used in this test and it will be noticed that over 66 per cent of the fruit was injured by russet caused by the Bordeaux spray. It will be seen also that the lime-sulphur controlled scab slightly better than Bordeaux. Bordeaux gave 12·36 per cent scab against 11·56 per cent for lime-sulphur and 67·44 per cent scab where the plot was not sprayed.

The results at Bridgetown were equally as conclusive as to the russeting of the fruit, but Bordeaux showed a little better control of the scab than lime-sulphur.

	p.c. Russet bad.	p.c. Scab medium.	p.c. Scab bad.
Bordeaux	60·8	0·7	0·0
Lime-sulphur	5·8	0·6	0·0
No spray	0·0	30·9	33·5

It will be seen that 64·4 per cent of the fruit of the trees not sprayed were badly or medium badly affected with the scab as against a very small percentage where Bordeaux or lime-sulphur was used.

The foliage was not injured so much from Bordeaux in this orchard, and during the early part of the season appeared to be if anything more vigorous in the Bordeaux plot than on the lime-sulphur; the condition changed, however, and as the season advanced the lime-sulphur plot had much less injury. The Gravenstein was used in this test.

At Falmouth, Bordeaux, as compared with lime-sulphur on a block of Spy apples, gave results as follows:—

	p.c. Russet	p.c. Scab.
Bordeaux	45·01	8·63
Lime-sulphur	0·12	3·94
No spray	0·00	47·01

The per cent of russet, it will be noticed, is quite large, and the lime-sulphur plots had less scab than the Bordeaux plots.

ALTERNATING BORDEAUX AND LIME-SULPHUR.

Various applications of Bordeaux alternating with lime-sulphur were tried to determine whether it is practical or advisable to use one or the other of these mixtures

at certain times. It would appear from results obtained that there is no advantage in doing so. In every case a decided russeting of the fruit with considerable foliage injury accompanied the use of Bordeaux.

BORDEAUX 3-3-40 VS. BORDEAUX 4-4-40.

To determine whether a weaker strength of Bordeaux would give less russeting and prove effective in controlling the apple scab, tests were made of a mixture made from 3 pounds copper sulphate, 3 pounds lime, and 40 gallons water, compared with the usual one made from 4 pounds copper sulphate, 4 pounds lime and 40 gallons water.

It was found that the weaker strength did not materially lessen the russet on the fruit and was less effective in the control of scab where the variety Gravenstein was used, as is shown in the following table:—

	p.c. Russet medium.	p.c. Russet bad.	p.c. Scab medium.	p.c. Scab. bad.
Bordeaux, 3-3-40	53·33	33·33	6·67	36·67
Bordeaux, 4-4-40	40·25	19·33	11·35	3·68

The per cent of russet was less with the weaker mixture in the Ben Davis under a similar test, but the scab was not controlled so well.

	p.c. Russet medium.	p.c. Russet bad.	p.c. Scab. slight.
Bordeaux, 3-3-40	41·96	21·01	23·77
Bordeaux, 4-4-40	42·32	27·66	10·14

On a Ribston block in the Falmouth orchard the Bordeaux 3-3-40 gave 10·33 per cent slightly scabbed and 36·32 per cent russeted as against 2·85 per cent slightly scabbed and 81·25 per cent russeted in the 4-4-40 Bordeaux.

THE RELATIVE EFFECT OF DIFFERENT BRANDS OF ARSENATE OF LEAD IN CAUSING FOLIAGE INJURY.

To determine whether some brands of arsenate of lead cause less injury to the foliage than others when used in combination with lime-sulphur, a series of tests were conducted by using two brands of English lead and Sherwin-Williams and Swift's lead with lime-sulphur, 1 gallon Niagara brand concentrate lime sulphur to 40 gallons water and duplicating the tests with 1 gallon to 30 of water.

The claim is made that certain brands of arsenate of lead are less liable to cause injury from arsenical burning after application. The Sherwin-Williams arsenate of lead, which is a neutral lead, is claimed to be safer on this account than those leads made by the acid process. That there is a difference in regard to possible injury from different makes is evident from data given below.

A comparison between Sherwin-Williams and Swift's arsenate (the two brands used very extensively in the valley) shows little if any difference as regards foliage

injury. The Swift's arsenate of lead averaged 2·60 per cent injury and the Sherwin-Williams plots averaged 2·47 per cent injury.

The data relative to leaf injury was obtained by taking 100 leaves from branches and twigs on a part of the tree showing least injury and 100 leaves from a part showing worst injury. These were taken consecutively as they grew. The leaves were gone over carefully and the per cent of injury determined. This work was checked up against field observations, which placed the injury in the same relative position.

The work was conducted on a block of Spy apples in the Berwick orchard. The results are as follows:—

Materials Used.	p.c. Scab Total	p.c. Foliage Injury
Lime-sulphur 1-40, Swift's arsenate— 2 lb. to 40 gal	38·58	1·45
" 1-40, Sherwin-Williams 2 " 40 "	25·68	2·57
" 1-40, Swift's arsenate 3 " 40 "	28·25	2·87
" 1-40, Sherwin-Williams 3 " 40 "	36·36	2·02
" 1-30 Swift's arsenate 2 " 40 "	20·10	3·50
" 1-30 Sherwin-Williams 2 " 40 "	25·83	2·82
Check, no spray	97·09	1·05
Sherwin-Williams arsenate alone, 2 lb. to 40 gal	96·63	1·13
Lime-sulphur 1-40, J. C. Eng. arsenate, 2 lb. to 40 gal	26·67	3·30
" 1-30, " " 2 " 40 "	16·51	6·85
" 1-40, S. C. " " 2 " 40 "	23·83	4·70
" 1-30, " " 2 " 40 "	23·36	10·71

FUNGICIDAL VALUE OF ARSENATE OF LEAD.

It is claimed that to add arsenate of lead to lime-sulphur the lime-sulphur will thereby be made more effective as a fungicide. A series of tests were started at Berwick and Falmouth to get information on this point but unfortunately the check plots and also the comparative plots in many cases did not produce fruit. On one block of Spy apples at Berwick the following results were obtained:—

	p.c. Scab Total	p.c. No. 1 & 2	p.c. No. 3	p.c. Cull
Lime-S. 1-40, 3 lb. arsenate lead	32·20	65·56	32·71	1·72
" 1-40 2 " "	32·13	67·86	36·68	0·45
" 1-30, 2 " "	22·96	67·77	30·58	1·64
Check, no spray	97·09	2·86	91·43	5·71
Arsenate of lead alone	96·63	2·86	95·28	2·86

The total scab on the lime-sulphur arsenate plots was for the most part only slight, whereas that on the unsprayed and arsenate of lead plots was largely medium or badly scabbed. The arsenate of lead when used alone at least apparently has little value as a fungicide. Results in the Falmouth orchard would go to show that lime-sulphur arsenate is preferable to lime-sulphur alone. The lime-sulphur arsenate had 19·07 per cent of scab and the lime-sulphur alone 29·25 per cent of scab.

HOME-BOILED VS. COMMERCIAL LIME-SULPHUR.

In order to determine the relative efficiency of home-boiled as compared with commercial lime-sulphur, a series of plots was sprayed with the two. The home-

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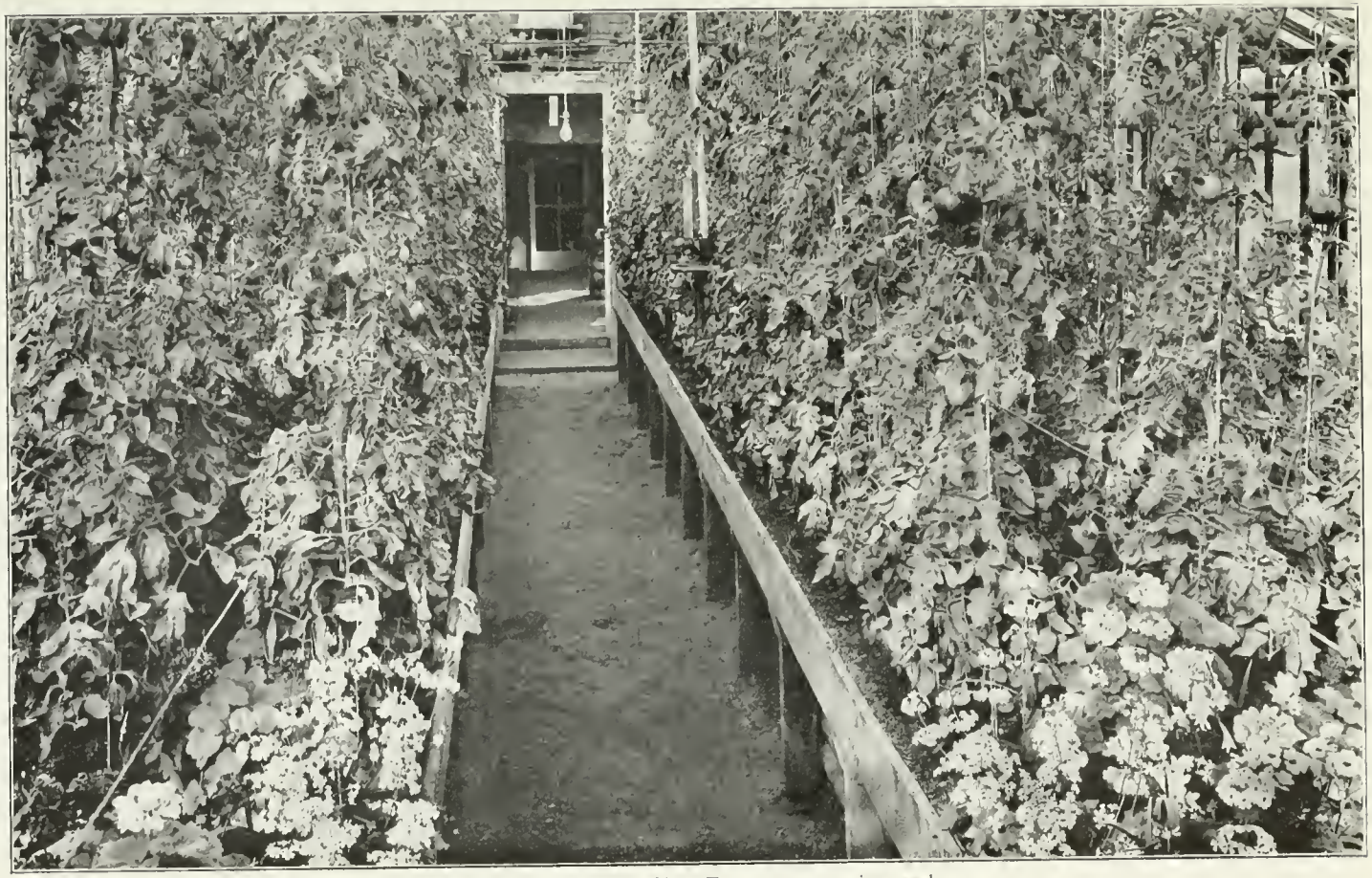

Kentville, N.S.—Livingston Globe Tomatoes, grown in greenhouse.

boiled was made according to the usual formula 50 pounds lime, 100 pounds sulphur and 50 gallons water, and boiled for one hour. Water was added from time to time to replace that lost from boiling, keeping the total volume up to 50 gallons.

The results obtained at Berwick are as follows:—

	p.c. Scab medium.	p.c. Scab bad.	p.c. Scab total.
Gravenstein.			
Home-boiled 1·008 s.g.	13·54	6·88	48·15
Commercial 1·008 s.g.	7·31	4·08	45·88
Ben Davis.	p.c. Scab slight.		
Home-boiled 1·009 s.g.	28·42		
Commercial 1·009 s.g.	10·98		
Home-boiled 1·008 s.g.	26·32		
Commercial 1·008 s.g.	14·39		

It would appear from the foregoing that the Niagara brand commercial lime sulphur was preferable to the home-boiled as it controlled scab better. On a block of Kings, however, in the same orchard the home-boiled had 21·15 per cent scab, as compared with 25·64 per cent on the commercial lime-sulphur plots.

At Bridgetown the per cent of scab was 27·3 on the home-boiled as compared with 17·0 on the commercial lime-sulphur plot.

TIME TO SPRAY.

In order to get some information as to the time that scab can be controlled to best advantage, in other words the most important spray for the control of apple scab, a series of experiments were made at Falmouth with lime-sulphur arsenate.

Date of Spraying.	p.c. Scab.
May 9, May 20, June 11, June 23, July 14	3·52
May 20, June 11, June 23	20·54
June 11, June 23, July 14	83·63
No spray	87·35

The foregoing would indicate that for this season at least the early spray on May 9 was the most effective.

SPRAYING EXPERIMENTS FOR THE CONTROL OF APHIS.

Young trees were used for this experiment. The leaves in many cases were curled, and some of the insects escaped the spray, which accounts for the aphis alive after the different mixtures had been put on.

The spraying was done August 4, and the trees were carefully examined and records made on August 6. During this period many of the aphis, not touched by the spray, spread over the trees, and had the records been taken earlier a better record as to the relative efficiency of the materials would no doubt have been obtained.

More definite results would have been secured had the leaves not been curled so that all the insects could be hit with the spray.

Where the materials recommended for aphis were used with lime-sulphur there was an injury, but unfortunately we had not a check plot sprayed with lime-sulphur alone and cannot tell but that similar injury would have resulted from an application of

lime-sulphur alone at this time. The injury on plots 20 and 22 was so marked, however, that this combination is apparently not advisable.

It would appear that Nico soap, 1 pound to 30 gallons, or Black Leaf 40, 1 part to 1000 is effective in killing the insect touched by the spray. The soap-kerosene emulsion, it will be noticed, is as effective as the flour kerosene emulsion, and costs only half as much. The latter, however, is much easier to make. The addition of soap to the Black Leaf 40, on plots 7, 8, and 9 should have increased the effectiveness of the spray, and that it did not may have been due to the possibility of more leaves being curled on these plots, and the aphis protected from the spray.

The Nico soap used was supplied by Blackie Bros., Halifax. The Black Leaf 40 was purchased from the Kentucky Tobacco Product Co., Louisville, Kentucky.

EXPERIMENT for Control of Apple Aphis.

Plot.	Materials and Quantities.	p.c. Aphis Killed.
1	Black Leaf 40, 5 oz. to 40 gal., 1 part to 1,280.	60·00
2	Nico Soap, 1 lb. to 40 gal.	62·5
3	Black Leaf 40, 5 oz. to 35 gal., 1 part to 1,120.	57·5
4	Nico Soap, 1 lb. to 30 gal.	80·0
5	Black Leaf 40, 8 oz. to 40 gal., 1 part to 800,.	77·5
6	Nico soap, 2 lbs. to 40 gal.	80·0
7	Black Leaf 40, 2½ oz.; Nico soap 8 oz. to 40 gal.	65·0
8	Black Leaf 40, 5 oz.; Nico soap 16 oz. to 40 gal.	65·0
9	Black Leaf 40, 5 oz., common soap 16 oz. to 40 gal	67·5
10	Common Soap 2 lb. to 30 gal.	50·0
11	Black Leaf 40, 5 oz., and lime sulphur to 40 gal., 1·008 s. g., slight injury.	80·0
12	Common soap, 2 lb. to 30 gal.	55·0
13	Common soap, 2 lb. to 40 gal.	55·0
14	Black Leaf, 40 5 oz. to 35 gal. and lime-sulphur 1·008 s.g., slight injury.	80·0
15	Black Leaf 40, 8 oz. to 40 gal. and lime-sulphur, 1·008 s.g., slight injury.	80·0
16	Nico soap, 1 lb. to 40 gal. and lime-sulphur, 1·008 s.g., slight injury.	55·0
17	Nico soap, 1 lb. to 40 gal. and lime-sulphur, 1·008 s.g., slight injury.	75·0
18	Nico soap, 1 lb. to 20 gal. and lime-sulphur, 1·008 s.g., slight injury.	80·0
19	Kerosene flour emulsion (10 lb. flour, kerosene oil 5 gal. to 40 gal. water), slight injury.	65·0
20	Flour emulsion as above and lime-sulphur, 1·008 s.g., badly injured.	80·0
21	Flour emulsion (5 lb. flour 2½ gal. kerosene) 40 gal. water, slight injury).	75·0
22	Flour emulsion (5 lb. flour 2½ gal. kerosene) and lime sulphur 1·007 s.g., badly injured.	80 0
23	Soap emulsion (½ lb. soap 2 gal. oil to 40 gal.,) slight injury.	82·5

COST OF DIFFERENT SPRAYS USED IN CONTROL OF APPLE APHIS.

In the work of controlling apple aphis we have worked out the cost of the different sprays used and have taken as a basis the cost per 40 gallons of dilute spray. The following table will show the difference in cost between the various sprays and combinations used:—

Materials.	Dilution.	Cost. $ cts.
Black Leaf 40.	5 oz. to 40 gallons	0 37
Black Leaf 40.	5 oz. to 35 gallons.	0·43
Black Leaf 40.	8 oz. to 40 gallons.	0 60
Nico soap.	1 lb. to 40 gallons.	0 47½
Nico soap.	1 lb. to 30 gallons.	0 63
Nico soap	2 lb. to 40 gallons.	0·95
Nico soap, 8 oz. and black Leaf, 40.	2·67 oz. to 40 gallons.	0·44
Nico Soap 1 lb. and Black Leaf, 40.	5 oz. to 40 gallons.	0 84½
Black Leaf, 40, 5 oz. and common soap.	14 oz. to 35 gallons.	0 43
Common soap.	4 lb. to 40 gallons.	0 20
Common soap.	2 lb. to 30 gallons.	0 13
Common soap.	2 lb. to 40 gallons.	0 10
Flour kerosene emulsion.	5 gal. kerosene, 10 lb. flour to 40 gallons	0 90
Flour kerosene emulsion.	2½ gal. kerosene 5 lb. flour to 40 gallons.	0 45
Soap kerosene emulsion.	2 gal. kerosene ½ lb. soap to 30 gallons.	0 44

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The cost of these mixtures has been calculated on the following basis:—

Black Leaf 4	$12.50	per gallon, or approximately $1.25 per pound.
Nico soap	47½	cents per pound.
Common soap	5	" "
Kerosene oil	15	" per gallon.
Flour	1½	" per pound.

THINNING APPLES.

Experiments in thinning were conducted at Bridgetown in the orchard of F. H. Johnson. The variety of Blenheim was used. Five trees were thinned and these were compared with seven trees unthinned. The trees were uniform and appeared to be equally well set with fruit. Approximately 17 per cent of the apples were removed from the thinned trees on the 15th of July.

The apples were counted when picked and were packed by the Banner Fruit Co., Ltd., Bridgetown. The apples were shipped to England through the United Fruit Companies of Nova Scotia, Ltd. In addition to the usual marking the letters A.B.F. were put on the barrels of unthinned fruit and M.B.D. on the barrels of thinned fruit, so that the shipment could be traced to the selling point.

Assuming that the apples would have been the same on thinned as on unthinned trees, had the thinning not been done, the yield from five trees would have been nineteen barrels, or the same as that actually picked. This shows that thinning does not necessarily lessen the yield, for the increase in size of fruit makes up for the apples removed by thinning.

The apples were sold on their merit and the purchaser knew nothing of the nature of the experiment. The following prices were received.

	Unthinned Fruit.	Thinned Fruit.
	$ cts.	$ cts.
No. 1	1 67	2 01
No. 2	1 67	1 66
No. 3	74	0 74

The No. 1 fruit from the thinned trees it will be noticed sold for 34 cents per barrel more than for the same grade in the unthinned trees.

THINNING EXPERIMENT.

Total number of apples on unthinned trees	24,014
Total number of barrels, tree run	37
Average number of apples per barrel	649
Number of apples removed by thinning	2,099
Number of apples on thinned trees	10,426
Number of apples per barrel, tree run	548

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PACKED OUT RESULTS.

	Unthinned Trees	Thinned Trees
	Bbls.	Bbls.
No. 1	11·75	11
No. 2	8·5	4
No. 3	9·50	·75
Cull	4·75	0·00
Slack	2·50	1·25

PROFITS FROM THINNING.

Grade	Unthinned Fruit. Barrels	Price per Bbl.	Total.	Thinned Fruit. Barrels.	Price per Bbl.	Total.
		$	$		$	$
No. 1	31·8	1·67	53.10	57·8	2.01	116.17
No. 2	23·	1.67	38 41	21·1	1·66	35·02
No. 3	25·7	·74	19 01	14·5	·74	10·73
Cull	12·8	·30	3·84			
Total			114.36			161.92

For comparison, and calculating on the basis of 100 barrels tree run, the above results are obtained which gives a profit of $47.56 from thinning 100 barrels.

THINNING GRAVENSTEINS.

An experiment in thinning Gravensteins similar to that in 1912 was carried on this season, and the results obtained compare favourably with the results of last year, giving a like increase in value of the thinned fruit.

The thinning was done on July 22, when the apples were the size of small crabs, and the thinning was done so that only one apple was left to a cluster; 14·61 per cent of the total apples on the tree were removed.

The Nos. 1, 2, 3, and cull apples were counted and the total ascertained. The fruit was packed by one of the companies of The United Fruit Companies of Nova Scotia, Ltd., without regard to any difference of treatment.

The following results were obtained:—

		Thinned.	Unthinned.
Number apples picked		3,447	3,897
Number apples removed		590	
Total apples on tree before thinning		4,037	3,897
Per cent. apples removed by thinning		14·61	
Per cent. total weight grading	No. 1	65·98	54·43
" " "	No. 2	14·50	12·44
" " "	No. 3	19·02	30·23
" " "	Cull	·41	2·54
" " "	Nos. 1 and 2	80·57	66·87

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Though it will be seen by the foregoing table that more apples were picked from the thinned than from the unthinned trees, yet when the number of fruits removed from the thinned tree are taken into consideration we have a total of 4037 in the thinned tree against a total of 3897 apples on the unthinned tree.

By making a comparison between the number of apples on each tree before thinning took place and the number of pounds of fruit taken from each tree and by calculating the weight of 100 apples as picked from the trees, we find that we have a decrease in weight due to thinning of 1·2 pounds in every 100 fruits picked, which gives a total decrease of 43 pounds in the fruit picked from the thinned tree.

By taking the per cents of Nos. 1, 2, 3, and cull fruit as obtained from the unthinned tree we have had ·18 barrels No. 1, ·04 barrels No. 2, ·10 barrels No. 3, and ·0085 barrels cull fruit, which would have been worth at the prices given below, 72 cents, 11, 11, and no cents respectively. Making a total of $0.94.

As this is a loss due to thinning it should be deducted from the total increase on the thinned tree as shown below.

VALUES of Thinned and Unthinned Fruit.

	Price per Barrel.	No. packed Barrels. Thinned.	Value.	Barrels. Unthinned.	Value.
	$		$		$
No. 1	4·00	4·86	19·44	4·05	16·20
No. 2	2·83	1·08	3·06	·92	2·60
No. 3	1·12	1·41	1·58	2·27	2·54
Cull	·25	·03	0·00	·19	·05
Total		7·38	24·08	7·43	21·39

Balance in favour of thinning per tree, taking picked apples	$	2·69
Deduction due to loss in total crop from thinning (as shown)		·94
Real increase in value from thinning per tree		1·75
Taking twenty bearing trees per acre per year the increased value from thinning 1 acre is		35·00

The price per barrel as given in foregoing table was the average price obtained by the United Fruit Companies of Nova Scotia, Ltd., for their first cargo of Gravensteins shipped to England.

ORCHARD SURVEYING.

For the purpose of getting information relative to the methods followed by orchardists, a survey was made during August of fifty orchards in Kings county.

DISTANCE OF PLANTING.

In many mature orchards the trees have not sufficient space to admit of a free circulation of air and to allow proper cultivation, harvesting and spraying. The fruit on the lower branches lack in colour, and the fruit buds on these branches lack in vigour. There seems to have been a tendency in recent years to plant even closer than formerly, which means that either a much more vigorous system of pruning back will have to be followed on the filler trees, or else many of these trees will have to be removed, if a first grade crop is to be obtained. Healthy foliage and well-coloured fruit cannot be expected under close-planted conditions unless a vigorous pruning, to give plenty of sunlight and air circulation, is practised.

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SYSTEM OF SOIL MANAGEMENT.

The general practice is to fall or spring plough the orchards, cultivate to July 1, and seed to a cover crop. This is done annually in 85 per cent of the orchards. The fall ploughing seems to have given good results as the spring ploughing. No case has been brought to our attention where any injury has followed fall ploughing. The thorough working of the orchards is a general practice, and this is done with the disc and spring-tooth harrow.

Some orchardists report excellent results from allowing alternate strips between the rows to remain for one year in clover. By this method one-half the ground in which the tree is growing is cultivated and the other half in clover sod. This gives a heavy growth of clover which is cut during the summer and ploughed under in the fall. Red clover is used where this is practised.

COVER CROP.

Twenty-six of the orchards visited were seeded to buckwheat, four used buckwheat and common vetch, three used clover, and the others used no cover crop. It would appear that buckwheat has largely replaced Crimson clover and vetch as a cover crop. This is due largely to the cost per acre for seed. The vetch or clover costs about $2.50 per acre for seed and the buckwheat about 50 cents. This disadvantage, however, is more than offset by added fertility secured from the use of a leguminous cover crop. It would appear that half buckwheat and half vetch is a good combination cover crop. Common vetch is the best cover crop to use.

FERTILIZERS.

Nearly 50 per cent of the orchards were fertilized principally with stable manure, and 25 per cent used stable manure in conjunction with commercial fertilizers. Muriate of potash was used at from 100 to 500 pounds per acre. Nitrate of soda from 50 to 200 pounds per acre, and phosphate fertilizers from 250 to 1,000 pounds per acre. Basic slag from 500 to 1,000 pounds per acre is now being used extensively. The tendency is toward annual moderate applications, and where this is being followed best results are being obtained.

SPRAYING

Only eight of the orchards visited were unsprayed, and those were only small areas. The general practice is to spray several times and, as will be seen from the following, the majority of growers give several applications:—

8	orchards	not sprayed.	
5	"	sprayed	twice.
15	"	"	three times.
12	"	"	four "
4	"	"	five "
6	"	"	six "

On sixty-seven per cent of the sprayed orchards, lime-sulphur arsenate was used; on 25 per cent Bordeaux arsenate was used for the first and lime-sulphur arsenate for the remaining sprays; on the remaining 8 per cent Bordeaux arsenate was used.

An effort was made to determine the number of gallons used per acre by different orchardists, but owing to lack of uniformity in the size of trees sprayed, little information of value was obtained. It was also noticeable that many growers were much more thorough in their application of the material, and the orchards given many applications were not in many cases as free from scab as those given fewer applications and that done thoroughly. In a great number of orchards the tops of the trees produced fruit with a much larger percentage of scab than the lower branches, which is due to the more thorough application of spray material to the lower parts of the tree.

KENTVILLE.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

CHARACTER OF SEASON.

The winter of 1912-13 was mild and favourable for fruit trees, shrubbery, etc., though the ground was rather bare for the best wintering of small fruits. Three very hot days in the latter part of April started some plants that were afterwards damaged by frost. May and June were both wet and cold, and so unfavourable was the weather at the blossoming period that pollination was most difficult, and the fruit crop a widespread failure. From July 1 onward the season was all that could be desired, and trees and plants went into winter in good condition.

HORTICULTURAL REPORT.

The land allotted for flowers and vegetables was a piece 187 by 300 feet, which had previously grown buckwheat; this was ploughed in the fall of 1912. The spring preparation of the land was retarded owing to the frost remaining in the ground until somewhat late in the season, but a start was made on the 20th May by the application of twenty-four loads of barnyard manure and, after a thorough discing, a dressing of 900 pounds of fertilizer containing 2·75 nitrogen, 10·6 phosphoric acid, and 8·3 potash was applied, the land was then gone over again with the disc harrow, rolled, and harrowed, with the spike-tooth harrow. Frequent cultivations during the summer kept the weeds down and conserved moisture.

About 7,000 ornamental trees and shrubs were set out in the nursery, and have done well, with the exception of some of the evergreens.

A flower border for annuals, 300 feet long by 5 feet wide was prepared, and about twenty varieties were grown and produced great quantities of bloom of high quality. Thirty varieties of waved sweet peas were grown in a row 300 feet long, and were in bloom from July 21 to October 17, making a background to the border.

A number of varieties of perennials were sown in cold frame and transplanted to nursery rows in readiness for planting out in their permanent quarters next spring.

The orchard, comprising 104 trees, had been very much neglected prior to the purchase by the Government, consequently the trees required a good deal of pruning, scraping and spraying. A number of Scott winter apples were top grafted with Tompkins King, Rhode Island Greening, Northern Spy, Yellow Bellflower (Bishop Pippin), Gravenstein, Ribston, McIntosh, and Merritts, and the majority have taken.

VEGETABLES.

A number of varieties of vegetables were grown during 1913. Owing to the backward spring, things made very slow growth, and it was not until the first week in July that any appreciable improvement was made.

In the following tables will be found the results obtained:

PEAS.

Seven varieties of garden peas were sown on June 2, in rows 100 feet long by 3 feet apart.

Variety.	Ready for use.	Crop.	Quality.
Gradus	July 31	Good	Very good.
Nott's Excelsior	" 28	Medium	Good.
Sutton's Excelsior	" 31	Good	Very good.
Premium Gem	" 29	Good	Poor.
Thos. Laxton	" 30	Good	Very good.
Heroine	Sept. 3	Poor	Medium.
Stratagem	Aug. 12	Medium	Good.

CABBAGE.

Five varieties of cabbage were sown in flats in hotbed on 24th April, and pricked out once, 13th May. All did well with the exception of Early Jersey Wakefield, which burst rather badly.

Variety.	Ready for use.	Quality.
Early Jersey Wakefield	Aug. 2	Excellent.
Copenhagen Market	" 10	Good.
Succession	" 2	Good.
Danish Ballhead	Sept. 20	Good.
Round Red Danish	" 28	Good.

BEETS.

Two varieties of beets were sown on June 4, and made excellent growth.

Variety.	Crop.	Quality.
Crosby's Egyptian	Good	Good.
Eclipse	Good	Good.

CARROTS.

Three varieties of carrots were sown on June 4, but came through very badly, probably owing to the presence of vast numbers of snake millipedes in the soil. A second sowing was made on July 2, which grew well and gave a satisfactory yield of roots of good quality.

Variety.	Crop.	Quality.
Chantenay	Good	Good.
French Horn	"	"
Improved Nantes	"	"

PARSNIPS.

One variety was sown on June 4 and produced a fair crop of medium quality.

BEANS.

Five varieties of beans were sown on June 4 in rows. All varieties rusted very badly.

Variety.	Ready for use.	Crop.	Quality.
Challenge Black Wax	July 21	Poor	Medium.
Ex. Early Red Valentine	" 22	Medium	Medium.
Stringless Green Pod	" 23	Medium	Good.
Improved Golden Wax	" 24	Good	Good.
Round Pod Kidney Wax	Aug. 5	Medium	Good.

TOMATOES.

Five varieties of tomatoes were sown in flats in hotbed on 22nd April, and pricked out twice.

Variety.	Ready for use.	Crop.	Quality.
Sparks Earliana	Aug. 28	Very good	Good.
Rennie's XXX Earliest	Aug. 29	Medium	Medium.
Bonny Best	Sept. 3	Medium	Good.
Chalks Early Jewel	" 3	Very good	Good.
Selected Trophy	" 16	Medium	Poor.

CORN.

Five varieties of table corn were planted in hills 3 feet apart each way on 4th June.

Variety.	Ready for use.	Crop.	Quality.
Early Malcolm	Sept. 15	Good	Good.
Golden Bantam	" 20	Good	Very good.
Crosby's Early	" 26	Medium	Medium.
Extra Early Cory	" 26	Medium	Good.
Country Gentleman	Oct. 1	Good	Good.

LETTUCE.

Five varieties of lettuce were sown in flats in hotbed on April 22, pricked out May 16, and planted out in open ground.

Variety.	Ready for use.	Quality.
Black Seeded Simpson	July 9	Good.
Grand Rapids	" 14	Very good.
Hanson	" 9	Good.
Iceberg	" 12	Good.
Salamander	" 9	Medium.

RADISH.

Three varieties, Early Scarlet White Tipped, Rosy Morn, and French Breakfast were sown at intervals of a fortnight and produced good crops.

CUCUMBER

Three varieties, Davis Perfect, Fordhook Famous, and Egyptian White Spine were sown on April 26, and produced excellent crops of well-shaped fruit, the first of which were cut July 25.

SQUASH.

Seven varieties were sown in hills 4 feet apart on June 21, and all made rapid growth, but only three produced any crop, viz.: Mammoth Whale, Vegetable Marrow, Long White Bush Marrow.

A thinning experiment with beets, carrots, and parsnips, to determine the distance apart which would be the more satisfactory, was tried. While the greater distance produced a heavier yield—except in the case of parsnips—the roots were much coarser and less desirable for table use than those grown closer together. The yields were computed from rows 15 feet long and 30 inches apart: the following tables show the results obtained.

BEETS.

Variety.	Yield per acre, 2 inches apart.		Yield per acre, 4 inches apart.	
	Tons lb.	Bush. lb.	Tons lb.	Bush. lb.
Crosby's Egyptian	13 617	443 37	18 591	609 51

CARROTS.

Variety.	Yield per acre, 1½ inches apart.		Yield per acre, 3 inches apart.	
	Tons lb.	Bush. lb.	Tons lb.	Bush. lb.
Chantenay	8 263	271 3	12 1845	430 45
French Horn	8 1424	290 24	11 70	367 59
Improved Nantes	7 520	242 00	11 651	377 32

PARSNIPS.

Variety.	Yield per acre, 2 inches apart.		Yield per acre, 4 inches apart.	
	Tons lb.	Bush. lb.	Tons lb.	Bush. lb.
Hollow Crown	13 617	443 37	11 70	367 50

FLOWERS.

The flowers which were grown produced a profusion of bloom which was much admired by visitors. *Dianthus superbissimus*, salpiglossis and verbena, were exceptionally fine.

Sown in hotbed on April 22.

Variety.	In Bloom.	
	From	To
Alonsoa Warscewiczii compacta	Aug. 9	Sept. 28
Dianthus superbissimus	July 18	" 28
Asters, ten varieties	" 31	" 26
Gaillardia	" 22	" 28
Lobelia	Aug. 3	" 28
Marigold, African	June 30	" 28
" French	July 2	" 28
Salpiglossis grandiflora, six varieties	" 31	" 28
Scabious, six varieties	Aug. 5	" 28
Sweet Sultan, three varieties	July 31	" 28
Verbena hybrida grandiflora	" 21	Oct. 10
Zinnia, six varieties	" 21	Sept. 14

Sown in the open on May 12.

Variety.	In Bloom	
	From	To
Candytuft, two varieties	June 27	Sept. 13
Godetia, two varieties	July 13	" 28
Linaria	" 8	" 24
Lupinus	Aug. 9	" 28
Malope, two varieties	July 16	" 28
Poppy, four varieties	" 27	" 28
Portulaca	" 21	" 28

CANNAS.

Fourteen varieties were started in hotbed on 13th May, and transplanted to flowering quarters on 16th June. The gorgeous colouring of the blooms and the handsome foliage gave a sub-tropical effect to the bed.

The following varieties were grown: Dr. Robert Funcke, Richard Wallace, Hof. Gaertner Hoppe, Feuermeer, Souvenir du President Carnot, Harry Laing, President

Meyer, Queen Charlotte, Rubin, Indiana, Progression, Elizabeth Hoss, Dr. Nansen, Wyoming.

DAHLIAS.

Thirty varieties were started in hotbed on 13th May, transplanted to flowering quarters on June 10. All bloomed freely until hard frost on September 28 destroyed their beauty.

The following varieties were grown: Countess of Lonsdale, Kynerth, Mrs. Chas. Turner, Cuban Giant, Island Queen, Ernest Glasse, Empress of India, Gabriel, M. D. Hallock, Earl of Pembroke, Cannell's Gem, Capstan, Kingfisher, Cactus Queen, Hector, Austin Cannell, Cycle, Miss Anne Jones, Kriemhilde, Matchless, Mrs. Leopold Seymour, Bon Ton, Sylvia, Susan Ingham, Queen of Primroses, Irridescent, Grand Duke Alexis, Clifford W. Bruton, Eoadne, Pendant.

PERENNIALS.

A collection of paeonies comprising the following twenty-one varieties was planted: Marguerite Gerard, Festiva Maxima, Mlle. Leonie Calot, Marie Lemoine, Madame d'Hour, Madame de Galhau, Livingstone, La Tulipe, Duchesse de Nemours (Calot), Charlemagne, Felix Crousse, Couronne d'Or, Mme. de Verneville, Octave Demay, Philomele, Marie Stewart, Mad. Emilie Galle, Marquis de Ivry, Mme. Auguste Dessert, Madame Geissler, Madame Buequet.

IRIS.

A collection of irises comprising the following twenty varieties was planted: Iris *florentina,* iris *germanica* Kharput, iris *hybrida* Duc de Nemours, Iris *hybrida* Mrs. H. Darwin, iris *hybrida* Verschnur, iris *neglecta* Agathe, iris *neglecta* Sappho, iris *orientalis Gigantea,* iris *plicata Gazelle,* iris *plicata* Lord Seymour, iris *plicata* Mad. Chereau, iris *plicata* Reine des Belges, iris *sambucina Solomon,* iris *squalens* Jacquesiana, iris *variegata* Coquette, iris *variegata* Darius, iris *variegata* Gracchus, iris *variegata* Honourable, iris *variegata,* Innocenza, iris *variegata,* Ossian.

POTATOES.

Six and one-seventh acres were planted to potatoes. The land, a lightish sandy loam, was ploughed out of a tough couch sod in the fall of 1912 and was well harrowed at intervals during the spring to kill as much couch and weeds as possible. Potatoes were not planted till from the 16th to 21st June. They were sprayed with Bordeaux mixture made with 4 pounds blue stone, 5 pounds lime, 1½ pounds arsenoid, and 40 gallons water. Scarcely any Colorado beetles were noticed, and there was no black rust.

The crop suffered somewhat from "Black Leg" and a species of rust attacked portions of the field. Those plots where there was no potash seemed to be affected most seriously. It did not kill the plants, however, till after 1st September.

Cultivation was kept up from three days after the potatoes were planted until the tops became too dense, and in this way the couch was never allowed to breathe.

On account of very wet weather in early October the crop was not dug until the last week of that month.

Ten pound samples of the different varieties of potatoes grown at the Central Experimental Farm, the Experimental Farm at Indian Head, the Experimental Farm at Nappan, and the Experimental Station at Charlottetown, were received and 66 sets of each planted in one row 66 feet long. The rows were 2½ feet apart. Some varieties locally grown were also planted in this varietal test, and seed grown from the Potato Field by Dr. S. T. Whitney, St. Stephen, N.B., were used in 330 hills. Ninety pounds

of hill selected Green Mountain seed, grown by C. F. Fawcett, Sackville, was planted in a plot by itself, and pure-bred Green Mountains, Delaware, Irish Cobblers, and Empire State from the same grower were planted partly in the potash experiments and partly in the commercial field; 2½ bushels Lowell's Green Mountains, from Frank Lowell, Gardiner, Me., and 1 bushel each of Carman and Snow from C. F. Grant, Woodford's, Me., were planted in the commercial field. The tenth-acre fertilizer plots and the balance of the commercial field were planted with good white New Brunswick stock, being a mixture of white varieties as sold on the market, mainly Delaware and Green Mountain.

A feature of the season of 1913 was the almost complete absence of Colorado Potato Beetles, and the cool dry weather of August and September was unfavourable to late blight-spores. On account of this general condition only two sprayings were given, August 13 and September 2. The character of the soil on the whole field was fairly uniform, and the outline of soil, preparation and management, as stated in connection with the fertilizer plots applies to the whole field.

As there was but limited cellar room available for the crop, 332 barrels were sold from the field, and loaded on a car at the C. P. R. siding on the Farm, for $1 per barrel. Most of the pure varieties have been cellared, and will be available for seed in 1914.

Before planting, all the seed was soaked in formalin solution, but notwithstanding this fact there were portions of the field where the crop was badly disfigured with scab, probably due to the sawdust in the city stable manure which had been applied some years before. The ground was full of mustard seed, necessitating considerable hand pulling to keep the field clean.

The total yield from the 6¼ acres was 1,774 bushels and 27 pounds, 1,596 bushels and 2½ pounds marketable, and 178 bushels and 24½ pounds unmarketable. There were approximately five barrels of rotten potatoes on the field. Some decay is apparent in the cellar.

The per acre yield of the whole field of all varieties and all kinds of fertilizing was 288 bushels and 51 pounds per acre. Some of this land was not fertilized at all and some of it with very unbalanced fertilizers. To give a clearer idea of the results obtained, we give herewith yields of the different portions of the field as divided into varieties and fertilizer experiments. The details of the different experiments are also given.

—	Acres.	Yield.	Yield per acre.
		Bush. lb.	Bush. lb.
154 varieties, (66 hills each).	2,3	191 9	286 43
15 fertilizer test plots	1 2/5	296 43	211 56
4 potash test plots	2	563 27	281 43
Commercial field	1 3/4	590 30	337 25
Lowell's Green Mountains	1/7	64	448
Grant's Carman	1/30	8 48	264
Grant's Snow	1/50	8 24	252
Empire State	1/14	28 20	396 4
Hills selected Green Mountains	1/20	23 06	462
Total	6 1/7	1774 27	

Average yield per acre for the whole crop, 288 bushels and 51 pounds.

In the potash test plots, the three half-acres on which were applied varying amounts of potash, averaged 311 bushels and 6 pounds per acre. The average for the four plots in the above table is pulled down on account of the small yield from the half-acre without any fertilizer.

FREDERICTON.

POTATOES.—Variety Test. 66 sets of each.—Yield per acre.

Variety.	Seed from.	Yield per Acre.						Remarks.
		Marketable.		Unmarketable.		Total.		
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	
Abundance	Ottawa	233	12	140	48	374		White, smooth, small even size.
Acquisition	"	314	36	143		457	36	White, smooth, some scab and rot, many small.
American Wonder	Nappan	264		41	48	305	48	White, fairly even and smooth, some scab, no rot.
" "	Indian Head	237	36	59	24	297		Pink, crimson, deep eyes, round scabby.
" "	Charlottetown	277	12	33		310	12	White, scabby, rather rough and a good many small.
" "	Ottawa	162	48	6	36	169	24	White, smooth, scabby.
(Ashleaf Kidney) Rawlings Kidney	Nappan	308		41	48	349	48	White, very scabby, smooth, even size.
" " " "	Charlottetown	325	36	70	24	396		White, scabby, some rot, medium size.
" " " "	Indian Head	215	36	19	48	235	24	White, very scabby, rather rough, no rot.
" " " "	Ottawa	299	12	61	36	360	48	White, rough, scabby.
Bermuda Early	"	52	48	15	24	68	12	Red, round, scabby with splits, intensely crimson eyes.
Bovee	"	338	48	61	36	400	24	Pink, some scab, uniform in size, and about all fit for market.
Brydon's Beauty	"	272	48	46	12	319		White, scabby, smooth, no rot.
Brydon	"	299	12	79	12	378	24	White, scabby, smooth and medium size.
Buckeye State	"	17	36	17	36	35	12	Pink, very small, very few, some scab.
Burpee's Extra Early	"	211	12	61	36	272	48	White, clean, rather uneven, some rough, though mostly smooth, one rotten.
Burbank's Seedling	Charlottetown	150	48	48	24	199	12	White, smooth, no scab, and even, medium size.
Carman No. 1	"	211	12	79	12	290	24	White, smooth, fair size, a good many small, just a touch of scab.
" "	Nappan	281	36	88		369	36	White, smooth, clean, and only a fair size.
" "	Ottawa	371	48	61	36	433	24	White, clean, fairly smooth, only one showing any sign of rot.
" "	Indian Head	299	12	26	24	325	36	White, some scabs, smooth, large size.
" No. 3	Ottawa	382	48	79	12	462		White, clean, very smooth, rather small, no rot.
Canadian Standard	"			13	12	13	12	Scabby, rotten and very small.
Clark's No. 1	Charlottetown	286		304	48	316	48	White, clean skin, rather deep eyes, many are large and rough with protuberances, only 2 showed rot.
Clyde	Ottawa	396		83	36	479	36	White, scabby, smooth, good size, and not much rot.
Conquering Hero	"	268	24	149	36	418		White, smooth, clean, and all a medium size fit for market.
Dalmeny Beauty	Nappan	145	12	30	48	176		White, smooth, but very small yield.
" "	Ottawa	286		70	24	356	24	White, smooth, no scab, no rot.
" "	Indian Head	422	24	39	36	462		Extra good yield and sample, white, smooth, a few rough, nothing small.
Dalmeny Hero	Ottawa	334	24	101	12	435	36	White, smooth, quite a lot of small.
Dalmeny Regent	"	301	24	59	24	360	48	White, rough, no scab and medium size.
Dalhousie Seedling	"	294	48	70	24	365	12	White, scabby, and smooth, being a medium uniform size.
Delaware	"	264		50	36	314	36	White, rough, uneven, mis-shapen.

Dobbie's Prolific	"	294	48	79	12	374		White, smooth, even, a good many small.
Dreer's Standard	Nappan	211	12	101	12	312	24	White, smooth, even, but many small.
" "	Ottawa	305	48	88		393	48	White, smooth, uneven.
" "	Charlottetown	387	12	52	48	449		White, smooth, even, large yield.
" "	Indian Head	402	36	39	36	442	12	White, rather rough, some scab, fairly even.
Early Hebron	Ottawa	272	48	61	36	334	24	Pink, rather uneven and rough, many small.
Early Market	"	180	24	26	24	206	48	Pinkish red, rough, rather deep eyes.
Early May	"	220		57	12	277	12	Pink, scabby, rough, a very small size.
Early Nebraska	"	347	36	68	12	415	48	White, scabby, smooth, no rot, a good large marketable size.
Early Norther	"	209		26	24	235	24	Red, smooth.
" "	Indian Head	281	36	41	48	323	24	Pink, a little scab, rough, a good size.
Early Ohio	Ottawa	272	48	66		338	48	Pink, scabby, fairly smooth, small, no rot.
Early Puritan	"			22		22		White, only 3 good sized potatoes in the row, run out.
Early Rose	"	235	24	63	48	299	12	Pink, scabby, smooth, no rot, a good size for table use.
Early Six Weeks	"	272	48	74	48	347	36	Pink, rough and scabby, fair size.
Early White Albino	"	305	48	50	36	356	24	White, scabby, smooth, no rot, and a good large size.
Early White Prize	Nappan	387	12	30	48	418		White, smooth, large and even, some rot.
Eldorado	Ottawa	171	36	167	12	338	48	White, smooth, a little scab, no rot, very uniform in size.
Emigrant	"	66		48	24	114	24	Pink, a little scab, smooth, a good uniform size.
Empire State	Charlottetown	264		46	12	310	12	White, no rot, little scab, smooth, very large.
" "	Indian Head	363		39	36	402	36	White, no rot, little scab, smooth, extra large.
" "	Ottawa	198	36	22		220	36	White, scabby, some dry rot, smooth, and a good size.
" "	Nappan	305	48	26	24	331	12	White, scabby, no rot, round, and a good size.
Eureka Extra Early	Ottawa	312	24	149	36	462		White, smooth, a little scab, no rot, and a medium size.
Everett	Nappan	281	36	140	48	422	24	White, smooth, good, medium size, a very little scab.
"	Indian Head	189	12	15	24	204	36	Pink, rough, large size, some scab.
"	Charlottetown	299	12	110		409	12	White, smooth, a good medium size, and very little scab.
Factor	Nappan	189	12	30	48	220		White, very smooth, good size, and very little scab.
"	Ottawa	297		88		385		White, very smooth, good size, a lot of scab.
"	Indian Head	189	12	35	12	224	24	Pink, rough, medium size, a little dry rot and scab.
Fannie Dean	Ottawa	167	12	176		343	12	White, smooth, small and scabby.
Gold Coin	Nappan	255	12	15	24	270	36	White, smooth, uniform size for table use, a little scab.
Gold Coin	Ottawa	286		79	12	365	12	Same as preceding, but larger.
"	Charlottetown	380	36	68	12	448	48	White, smooth, large, no scab.
Gold Finder	Ottawa	96	48	61	36	158	24	White, smooth, a fair size, no scab, but poor yield.
Green Mountain	"	332	12	70	24	402	36	White, large, smooth, a little scabby.
" "	Charlottetown	409	12	37	24	448	36	Same as Ottawa only a little smaller and not so much scab
Green Mountain Jr	Ottawa	270	36	37	24	308		Same as preceding, but rounder.
Hard to Beat	"	165	..	48	24	213	24	White, smooth, a little scab, medium size.
" "	Indian Head	145	12	26	24	171	36	White, smooth, very large, and no scab.
" "	Nappan	154	..	26	24	180	24	Same as preceding, only very scabby.
Harris Snowball	Ottawa	129	48	33		162	48	White, smooth, very large and no scab.
Hebron	Indian Head	189	12	24	12	213	24	Light pink, smooth, medium size, and very little scab.
Houlton Rose	Ottawa	437	48	74	48	512	36	Pink, smooth, no scab and good size for table use.
" "	Indian Head	114	24	22		136	24	Pink, smooth, a little scab, fair size only, quite a lot of rot.
Irish Cobbler	Nappan	396	..	92	24	488	24	White, smooth, good size, and a little scab.
" "	Ottawa	363		85	48	448	48	Same as preceding, only a little smaller.
" "	Indian Head	378	24	35	12	413	36	White, smooth, very large, and no scab.
" "	Charlottetown	294	48	57	12	352	..	White, smooth, medium size, a little scab.
Late Puritan	Nappan	294	48	79	12	347	..	White, smooth, good size, and no scab.
Late Puritan (B)	Ottawa	308	..	59	24	367	24	White, smooth, good size good, and no scab.

FREDERICTON.

POTATOES.—Variety Test, 66 sets of each.—Yield per acre. —*Continued.*

Variety.	Seed from.	Yield per Acre.						Remarks.
		Marketable.		Unmarketable.		Total.		
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	
Late Puritan	Indian Head	380	36	74	48	455	24	White, smooth, large, and no scab.
Longkeeper	Ottawa	167	12	99		266	12	White, smooth, medium size, a little scab.
Langworthy	"	195	48	37	24	233	12	White, smooth, small, and no scab.
Manistee	"	365	12	22		387	12	Pink, smooth, good medium size, no scab.
McIntyre	Charlottetown	352		39	36	391	36	White, rough, fair size, scabby.
Monarch	Ottawa	180	24	158	24	338	48	White, smooth, small, no scab and very little rot.
Money Maker	Nappan	228	48	35	12	264	..	White, smooth, good size, and no scab.
" "	Ottawa	316	48	123	12	440	..	White, smooth, fair size, a little scab.
" "	Indian Head	233	12	8	48	242		Same as preceding, but a little smoother.
Morgan Seedling	Charlottetown	312	24	44	..	356	24	Pink, smooth, medium size, very little scab.
" "	Indian Head	367	24	77	..	444	24	White, smooth, very large, and no scab.
" "	Ottawa	484		39	36	523	36	Pink, smooth, medium size, a little scabby.
" "	Nappan	171	36	26	24	198	..	Light pink, smooth, large, and no scab.
New Chieftain	Ottawa	189	12	61	36	250	48	White, smooth, medium size, no scab or rot.
New Colonist	"	378	24	39	36	418	..	White, smooth, good size for table use, no scab or rot.
New Guardian	"	202	24	39	36	418		White, smooth, medium size, no scab or rot.
New Scotch Rose	"	501	36	129	48	631	24	White, smooth, large, no scab and very little rot.
New Queen	"	228	48	13	12	242	..	Pink, smooth, good size for table use, no scab or rot.
"	Indian Head	233	12	26	24	259	36	Pink, medium, smooth, large, no scab or rot.
Norcross	Ottawa	206	48	48	24	255	12	White, rough, fairly large, no scab, but some rot.
Ohio	"	26	24	17	36	44	..	
Pierremont Seedling	"	211	12	105	36	316	48	White, smooth, medium size, no scab or rot.
Provost	"	171	36	160	36	332	12	White, smooth, small, no scab or rot.
Pan American	"	202	24	30	48	233	12	White, smooth, very small, no scab or rot.
Prince Albert	"	290	24	17	36	308	..	White, rough, good table size, no scab, a large amount of rot.
Puritan	Charlottetown	156	24	35	12	171	36	White, smooth, large, no scab or rot.
Queen of the Hebrons	Ottawa	52	48	35	12	88		White, smooth, table size, little scab and some rot.
Reeves Rose	Nappan	281	36	33	..	314	36	Pink, smooth, large, deep eyes, no scab or rot.
" "	Indian Head	180	24	39	36	220	..	Same as preceding only a little smaller.
Rochester Rose	Nappan	308	..	44		352		Pink, smooth, deep eyes, large, no scab or rot.
" "	Ottawa			13	12	13	12	Absolute failure.
" "	Indian Head	169	24	26	24	195	48	Pink, smooth, deep eyes, medium, no scab or rot.
" "	Charlottetown	272	48	35	12	308		Pink, smooth, deep eyes, small, scabby and some rot.
Rose of the North	Ottawa	118	48	55		173	48	Pink, smooth, small, scabby and some rot.
Royalty	"	226	36	149	36	377	12	White, smooth, deep eye, small, a little scab, but no rot.
Rural New Yorker	Charlottetown	237	36	39	36	277	12	White, smooth, table size, a little scab and no rot.

Satisfaction	Ottawa	301	24	85	48	387	12	White, smooth, table size, very little scab and no rot.
Superlative	"	288	48	48	24	277	12	White, smooth, large, a little rot, very scabby.
Scottish Triumph	"	272	48	30	48	303	36	White, smooth, a little scab, and no rot.
Sharp's Victor	"	149	36	169	24	319		White, smooth, very small, very little scab and no rot.
Silver King	"	352	..	74	48	426	48	White, smooth, table size, no scab and no rot.
Snow	"	343	12	52	48	396		White, smooth, table size, no scab and no rot.
St. Patrick	"	63	48	39	36	103	24	White, smooth, medium, a little scab and no rot.
Sir Walter Raleigh	"	330		72	36	402	36	White, smooth, medium, a little scab and no rot.
Sir John Llewellyn	"	259	36	88	..	347	36	White, rough, medium, scabby, and no rot.
Table Talk	Nappan	431	12	114	24	545	36	White, smooth, good medium size, a little scab and no rot.
"	Ottawa	316	48	44		360	48	White, smooth, good medium size, a little scab and no rot.
Table Talk (B)	"	281	36	70	24	352		White, smooth, medium size, very little scab and no rot.
Table Talk	Indian Head	374		48	24	422	24	White, smooth, small, uneven, no scab or rot.
"	Charlottetown	358	36	83	36	442	12	White, rough, medium size, a little scab, and no rot.
Todd's Wonder	Ottawa	270	36	19	48	290	24	White, smooth, table size, a little scab and no rot.
The Scott	"	264		61	36	325	36	White, smooth, medium, scabby, but no rot.
The Moreton	"	316	48	55		371	48	White, smooth, large, scabby, but no rot.
Up to Date	"	259	48	39	36	290	24	White, smooth, table size, scabby, but no rot.
Vick's Extra Early	Nappan	463	12	68	12	531	24	White, rough, small with a few large, no scab or rot.
" "	Indian Head	145	12	13	12	158	24	Pink, smooth, medium size with a few small, no scab, a little dry rot.
" "	Charlottetown	451		26	24	477	24	White, smooth, large, no scab or rot.
Gold Coin	Ottawa	220		48	24	268	24	White, smooth, medium, no scab or rot.
" "	Indian Head	360	48	33		393	48	White, smooth, table size, a little scab or rot.
Warrior	Ottawa	391	36	129	48	521	24	White, smooth, large, scabby, no rot.
Wee McGregor	Nappan	338	48	83	36	422	24	White, smooth, medium, a little scab and rot.
"	Ottawa	391	36	88		479	36	White, smooth, table size, a little scab and rot.
"	Indian Head	255	12	17	36	272	48	White, smooth, large, scabby, no rot.
"	Charlottetown	404	48	11	48	446	36	White, smooth, quite small, very little scab, no rot.
White Chief	Ottawa	352		63	48	415	48	White, smooth, good table size, no scab or rot.
White City	"	343	12	39	36	382	48	White, smooth, table size, scabby, a little rot.
Windsor Castle	"	99	..	83	36	182	36	Pink, smooth, small, no scab, or rot.
Yellow Transparent	"	30	48	17	36	48	24	White, smooth, small, a little scab and no rot.
McCullough	Sussex	92	24	83	36	176		Purple, smooth, uniform table size, no scab or rot.
"	Scotch Lake	365	24	88		453	12	Purple, smooth, small, no scab or rot.
Green Mountain	"	356	24	24	12	380	56	White, smooth, a good table size, no scab or rot.
Green Mountain, selected	Sackville	341	..	17	36	358	36	White, smooth, a good table size, no scab or rot.

The 330 hills planted with tubers grown from the Potato Ball seed in 1912 by Dr. S. T. Whitney, St. Stephen, N.B., were put in bags separately and will be reported on after examination. It is proposed to discard the poorest hills, and try out most of them next season.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

REPORT OF THE SUPERINTENDENT—JOS. BEGIN.

The first fruit trees were planted here at this new Experimental Station during the spring of 1913. It would seem at first impossible to grow tree fruits in this latitude—47·22—where our Station is located. However, the climatic conditions of our district are such that most of the fruits could be grown here with success and profit.

The new land annexed to our Station will enable us to enlarge the experimental ground for fruit and vegetable growing. Four acres are already planted in fruit, which have been well drained and prepared.

CHARACTER OF SEASON.

The winter of 1912-13 having been exceptionally rainy and windy, with a comparatively light snowfall, the ground was left bare, and froze deeply. The winter was over about the end of March, when the weather became rather dry, with a few hot days about the end of April, which month was the driest of the season—only ·72 inches of rain falling. On account of want of early rain, the ground remained cold, and some frost was found even at the end of May. Such a condition delayed vegetation considerably and, after having had signs of an early spring, trees really bloomed about two weeks later than usual in this district and, during the whole season, temperatures continued variable and far below the usual average of former years.

APPLES.

Two hundred and eighteen trees of the following varieties were planted on the 9th and 10th of May, 1913: Alexander 15, Afghanistan 2, Anson 1, Battle 1, Bethel 2, Bingo 2, Bruno 2, Broek 2, Burgess Crab 2, Calumet 2, Canada Red 2, Carno 2, Charlamoff 2, Cora 2, Canada Baldwin 2, Cobalt 2, Danville 2, Dudley 2, Duchess of Oldenburg 19, Evaline 2, Fameuse 5, Forest 2, Galetta 1, Garner 2, Golden Russet 2, Glenton 2, Homer 2, Herald 2, Hyslop Crab 2, Kelso 2, Melba 2, Melvin 2, Montreal peach 5, Milwaukee 2, Montreal beauty 2, McIntosh 7, McMahon 2, Medford 2, Niobe 2, North Star 1, Nora 1, Neville 2, Nepean 2, Northwestern Greening 2, Oswald 2, Okabena 2, Petrel 2, Pensaukee Russet 2, Pinto 2, Pomme Royale 2, Prosper 2, Peerless 2, Rouleau 2, Radnor 2, Rosalie 2, Ripon 2, Rupert 2, Rufus 2, Red Astrachan 2, Rocket 2, Roger 2, St. Lawrence 16, Sorel 2, Stark, 2, Scott Winter 2, Shiawassee 1, Tetofsky 2, Thurso 2, Wealthy 17, Walter 2, Wolf River 12, Whitney Crab 2.

PLUMS.

Eighty-one trees of the following varieties: Admiral Schley 1, Coe's Golden Drop 5, Bonne Ste. Anne 2, Braekett 2, Damson 5, Gueii 2, Grand Duke 5, Gozzling 2, Harrigan 1, Imperial Gage 5, Lombard 5, Large Blue Seedling 1, Moore's Arctic 5, Niagara 5, Oyama 2, Pond Seedling 5, Quebec 2, Reine Claude 10, Shippers' Pride 5, Terry 2, Voronesh Yellow 1, Washington 5.

CHERRIES.

Forty varieties, as follows: Brusseler Braun 2, Cerise de France 5, Cerise d'Ostheim 2, English Morello 3, Fouche Morello 3, Griotte Morello 1, Griotte d'Ostheim 1, Herzformige Weichsel 2, Early Richmond 5, Large Montmorency 5, Minnesota Ostheim 2, Montmorency Ordinaire 2, May Duke 2, Suesse Fouche Morello 1, Suesse Fouche Weichsel 1, Vladimir 3.

The ground used for this last plantation having been drained in 1912 and thoroughly prepared the preceding fall, was in very good condition when planted.

These trees have for the most part grown well. Record as to growth is as follows: Apples, 82 per cent good, 14 per cent medium, 1 per cent bad, 3 per cent dead. Plums, 90 per cent good, 5 per cent medium, 4 per cent bad, 1 per cent dead. Cherries, 68 per cent good, 7 per cent medium, 25 per cent dead.

Permanent trees were planted in rows 25 feet apart and 30 feet apart in the rows while another temporary tree of a different variety was also planted between each two permanent trees in the rows. These temporary trees are mainly new and young and are intended to remain in the rows for some years, when their value will be tested, after which they will be removed.

The ground was kept under perfect cultivation, and consequently weeds, chiefly couch grass, infesting it to a great extent, were completely eradicated. Rape gave a fair result enough as a cover crop. As a whole, the orchard already makes a splendid display.

Sites for garden and ornamental grounds have not yet been located. Meanwhile, 2,000 tulip bulbs of the following varieties were planted in nursery: Artus 500, Chrysolora 500, Cottage Maid 200, Duchesse de Parma 100, Joost Von Vondel (Red) 500, Joost Von Vondel (White) 100, Keizerskroon 100, La Reine 200, Pottebakker (White) 200, Pottebakker (Scarlet) 100, Proserpine 100, Vermilion Brilliant 100.

A low and moist area 4 acres large was drained with tiles every 25 feet. It was a piece of waste land, most part of which had never been cultivated. Thoroughly prepared during August and September, the ground will be ready to be planted in the spring of 1914.

STE. ANNE DE LA POCATIERE.

EXPERIMENTAL STATION, CAP ROUGE, P.Q.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

CHARACTER OF THE SEASON.

The past season was, in general, a very good one for the horticulturist of this district. The fact that a rather large quantity of tomato seed was produced at the Station, also that peppers and egg plants matured fruit shows that there was plenty of heat and sunshine. There was also enough precipitation, and what is most important, it came at the right time.

There were two exceptions to note. The first was the injury done by the frost of the middle of May to the early flowering fruit trees, and the second, the damage wrought by a small hailstorm to the currants and gooseberries which happened to be in bloom then.

But it may be said that 1913 was the best season of the three past for horticultural plants.

FRUIT.

APPLES.

Most of the area transferred from the field husbandry to the horticultural department was planted to apple trees in 1913. The varieties put in are as follows: Baxter 12, Bethel 12, Bingo 2, Black Ben Davis 2, Calumet 2, Carno 2, Cobalt 1, Danville 2, Dudley 12, Edith 2, Eike 2, Evaline 2, Excelsior (crab) 2, Florence (crab) 1, Galetta 11, Glenton 2, Homer 2, Inkerman Greening 2, Iowa Beauty 2, Langford Beauty 12, Lobo 2, Lubsk Queen 12, Luke 2, Melvin 2, McIntosh Red 80, McIntosh Sweet 2, Nepean 2, Neville 2, Niobe 2, Nora 2, Okabena 12, Oswald 2, Palmer 1, Pinto 2, Prosper 2, Queen of Jubilee 2, Reinette de Damson 1, Ripon 2, Rochelle 11, Rocket 2, Roger 2, Rome Beauty 2, Rouleau 12, Severn 2, Trenton 1, Walton 12, Wealthy 204. Total 467.

Unfortunately, a large number of McIntosh and many Wealthys died. It was found out that these trees, though apparently in good condition, had suffered in the nursery where they were bought.

Only one Wealthy, planted in 1911, produced fruit, whilst last year a few of the Yellow Transparents gave apples.

There are now 11·50 acres in apple orchard, and we are following a four-year rotation of vegetables, grain, clover and timothy in the spaces between the trees, leaving 4 feet on each side of them where a cover crop is sown at the beginning of July.

PLUMS.

Only a few trees were replaced in the plum orchard, which has an area of ·74 acre.

The following trees, planted in 1911, gave plums in 1913: Wolf (one of two trees), Fitzroy (one of two trees), Terry (one of two trees), Mankato (one of two trees), Bixby (one of two trees).

CHERRIES.

The cherries were moved from the bad low spot where they had been planted to a better location north of the plum orchard. The snow, which piles up to over 6 feet in height, where they were, broke most of the trees, so that the area given to them is only .27 acre.

A few *Prunus tomentosa*, covering an area of .07 acre were transplanted south of the plum orchard from the unfavourable piece of ground where they had been planted in 1911.

SMALL FRUIT.

Sixteen varieties of black currants, twelve of red, three of white, twelve of gooseberries, eleven of raspberries, eighteen of strawberries and thirty of grapes are under test. As some of these were only planted one or two years ago it is too early to say which will do best. However, the following tables may be of interest:

Small Fruits at Experimental Station, Cap Rouge, Que.

Kind of fruit.	Color.	1911. Planted Spring.	1911. Living Autumn.	1912. Living Spring.	1912. Planted Spring.	1912. Living Autumn.	1913. Living Spring.	1913. Planted Spring.	1913. Living Autumn.	Number of years planted.	Total plants set.	Died during growing season.	Winter killed.	Died—per cent.	Yield per acre. Second year. All plants.	Yield per acre. Second year. Living.	Yield per acre. Third year. All plants.	Yield per acre. Third year. Living.	Average. Yield per acre for two years. All plants.	Average. Yield per acre for two years. Living.	Rank as to productivity. All plants.	Rank as to productivity. Living.	Rank as to Earliness.	Rank as to Size.	Rank as to Quality.	Rank as to Appearance.
Black Currants.															lb.	lb.	lb.	lb.	lb.	lb.						
Boskoop Giant		6	6	6		6	6		6	3	6				594	594	1,491	1,491	1,042	1,042	1	1	5	1	12	1
Buddenborg		6	6	5	1	6	6		6	3	7		1	14·3	145	174	522	626	333	400	6	12	5	1	12	1
Champion		6	6	5		5	4	1	5	3	7	1	1	28·6	87	104	725	1,087	401	595	5	5	2	2	3	3
Climax		6	6			6			6	3	6				754	754	1,247	1,247	1,000	1,000	2	2	5	1	3	2
Clipper		6	6	1	5	6			6	3	11		5	45·4	87	522	58	348	72	435	14	9	2	2	1	1
Collins Prolific		6	6	4	1	5	5	1	6	3	8		2	25·00	232	348	348	523	290	435	10	9	5	2	5	2
Eagle		6	6			6			6	3	6				275	275	1,073	1,073	674	674	3	3	2	2	3	2
Eclipse		6	6	5	1	6			6	3	7		1	14·3	261	313	209	251	235	282	12	14	2	2	2	2
Kerry		6	6	5	1	6			6	3	7		1	14·3	145	174	464	557	304	365	8	13	2	2	2	2
Lee Prolific		6	6	5		5	5	1	6	3	7		1	14·3	145	174	696	835	420	504	4	7	2	2	1	2
Magnus					6				6	2	6				29	29					16	16	1	1	2	2
Ontario		6	6	3		3	3		3	3	6		3	50·00	58	116	551	1,102	304	609	8	4	2	2	2	2
Saunders		6	6	4	2	6	6		6	3	8		2	25·00	174	226	493	739	333	482	6	8	2	2	2	2
Success		6	6		5	5	5	1	6	3	12		6	50·00	29	35					15	15	1	1	1	2
Topsy		6	6	3	3	6	6		6	3	9		3	33·3	87	174	347	694	217	434	13	11	3	1	3	2
Victoria		6	6	4	1	5	3	1	4	3	8		4	50·00	102	153	454	908	278	530	11	6	4	1	2	1
Red and White Currants.																										
Cherry	R	6	6	1	3	4	2	2	4	3	11		7	63·6	188	1,131	362	2,175	275	1653	9	12	4	4	12	2
Cumberland	R	6	6	6		6	6		6	3	6				58	58	696	696	377	377	5	12	5	4	1	2
Fay's Prolific	R	6	6	6		6	6		6	3	6				87	87	899	899	493	493	2	4	6	2	1	2
Greenfield	R	6	6	5	1	6	6		6	3	7		1	14·3	101	122	203	253	152	187	12	13	4	4	1	2
Large White	W	6	6	5		5	5	1	6	3	7		1	14·3	145	174	435	522	290	348	7	8	4	3	2	2
Perfection	R	6	6	4		4	4	2	6	1	8		2	25 00	15	217	377	565	196	391	10	6	6	1	3	2
Pomona	R	6	6	1	2	3	3		3	3	8		5	62·5	15	87	58	348	36	217	11	12	3	2	3	2

Cap Rouge.

Rankin's Red	R	6	6	6	....	6	6	....	6	3	6	....	....	.....	29	29	174	174	10½	101	13	14	4	3	2	....	....	....	....
Red Cross	R	....	....	6	....	6	6	....	6	2	6	....	....	.....	56	56	....	....	....	....	....	....	7	2	4	....	....	....	....
Red Dutch	R	6	6	5	1	6	6	....	6	3	7	....	1	14·3	102	122	472	567	287	344	8	9	2	4	1	....	....	....	....
Red Grape	R	6	6	4	1	5	5	1	6	3	8	....	2	25·00	812	974	2,276	2,731	1,544	1,852	1	1	5	3	5	....	....	....	....
Victoria	R	6	6	6	....	6	5	....	5	3	6	....	1	16·6	148	148	435	516	291	332	6	10	1	3	2	....	....	....	....
White Cherry	W	6	6	4	2	6	6	....	6	3	8	....	2	25·00	57	85	275	413	166	249	11	11	4	4	1	....	....	....	....
White Grape	W	6	6	3	2	5	5	1	6	3	9	....	3	33·3	57	114	928	1,855	492	984	3	3	4	2	3	....	....	....	....
Wilder	R	6	6	6	....	6	6	....	6	3	6	....	....	.....	57	57	812	812	434	434	4	5	5	1	3	....	....	....	....
Gooseberries.																													
Downing		6	6	6	....	6	6	....	6	3	6	....	....	.....	551	551	2,885	2,885	1,718	1,718	2	2	3	....	....	....	....	....	....
Gibb		6	....	4	1	5	5	....	5	3	7	....	2	28·5	248	381	805	1,206	526	783	8	8	1	....	....	....	....	....	....
Houghton		....	....	....	6	5	5	1	6	2	7	1	....	14·3	116	139	....	....	....	....	....	....	1	....	....	....	....	....	....
Industry		6	6	6	....	6	6	....	6	3	6	....	....	.....	87	87	1,642	1,642	864	864	7	7	3	....	....	....	....	....	....
Josselyn		6	6	6	....	6	6	....	6	3	6	....	....	.....	87	87	2,905	2,905	1,496	1,496	3	4	3½	....	....	....	....	....	....
Mabel		6	6	6	....	6	6	....	6	3	6	....	....	.....	696	696	4,118	4,118	2,407	2,407	1	1	2	....	....	....	....	....	....
Pearl		....	....	....	6	5	5	....	5	....	....	1	....	16·6	130	157	....	....	....	....	....	....	3½	....	....	....	....	....	....
Queen Ann		6	6	5	....	5	5	1	6	3	7	....	1	14·2	275	330	2,450	2,950	1,362	1,640	4	3	2	....	....	....	....	....	....
Rideau		6	6	4	1	5	5	....	5	3	7	....	2	28·5	87	131	718	1,077	402	604	9	9	2	....	....	....	....	....	....
Josselyn (Red Jacket)		6	6	6	....	6	6	....	6	3	....	....	....	.....	203	203	2,038	2,038	1,120	1,120	6	6	3	....	....	....	....	....	....
Saunders		6	6	5	1	6	5	....	5	3	7	....	2	28·5	73	98	681	1,024	377	561	10	10	3	....	....	....	....	....	....
Silvia		6	6	5	....	5	5	....	5	3	6	....	1	16·6	304	365	2,146	2,575	1,225	1,470	5	5	3	....	....	....	....	....	....
Raspberries.																													
Brighton		....	....	....	16	11	11	....	11	2	16	....	....	31·2	291	423	....	....	....	....	....	....	7	2	4	2	....	....	....
Columbian		12	....	7	....	7	....	....	6	3	12	....	....	50·0	1,491	2,413	2,576	6,866	2,033	4,639	2	1	8	1	5	2	1	2	....
Count		....	....	....	16	8	....	....	6	2	16	....	....	62·5	317	844	....	....	....	....	....	....	6	2	4	....	2	....	....
Cuthbert		....	....	....	16	6	....	....	4	2	16	....	....	75·00	49	194	....	....	....	....	....	....	2	....	....	....	....	....	....
Eaton		12	....	12	4	16	....	....	12	3	16	....	....	25·00	647	647	1,277	1,702	962	1,174	5	4	3	1	1	2	1	....	....
Heebner		12	....	12	4	16	....	....	13	3	16	....	....	18·7	566	566	1,762	2,349	1,164	2,915	3	2	5	2	4	2	1	....	....
Herbert		12	....	12	4	16	....	....	16	3	16	....	....	.....	776	776	3,848	3,848	2,312	2,312	1	3	3	1	2	1	1	....	....
King		12	....	12	4	16	....	....	16	3	16	....	....	.....	663	663	1,132	1,132	897	897	6	6	1	1	4	1	1	....	....
Loudon		12	....	12	4	16	....	....	16	3	16	....	....	.....	372	372	1,568	1,568	970	970	4	5	4	2	6	1	1	....	....
Marlboro		12	....	12	4	16	....	....	16	3	16	....	....	.....	65	65	1,240	1,240	652	652	7	7	3	1	3	1	1	....	....
Sarah		12	....	12	4	16	....	....	11	3	16	....	....	31·2	178	178	194	211	186	194	8	8	9	2	3	2	1	....	....
Strawberries.																													
Beder Wood (Per)		....	....	....	50	50	....	50	50	....	50	....	....	.....	490	490	....	....	....	....	....	....	2	....	4	2	2	2	....
Bisel (Imp.)		15	....	....	25	25	....	50	50	....	50	....	....	.....	2,928	2,928	4,745	4,745	....	....	....	....	4	3	3	2	2	3	....
Buster (Imp.)		....	....	....	50	50	....	50	50	....	50	....	....	.....	962	962	....	....	....	....	....	....	5	3	4	2	3	....	....
Clyde (Per.)		....	....	....	10	0	....	....	....	....	10	10	....	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Enhance (Per.)		....	....	....	40	3	....	3	3	....	40	37	....	92½	36	605	....	....	....	....	....	....	5	....	....	....	....	....	....
Excelsior (Per.)		....	....	....	50	36	....	43	43	....	50	14	....	28	182	252	....	....	....	....	....	....	1	4	5	1	....	....	....
Glen Mary (Per.)		....	....	....	50	50	....	50	50	....	50	....	....	.....	1,688	1,688	....	....	....	....	....	....	5	1	1	3	....	....	....
Greenville (Imp.)		15	....	....	25	25	....	50	50	....	50	....	....	.....	1,815	1,815	4,066	4,066	....	....	....	....	5	3	4	2	3	....	....
Nettie (Per.)		24	....	....	50	50	....	50	50	....	50	....	....	.....	....	....	1,470	1,470	....	....	....	....	7	4	3	3	3	....	....
New Globe (Per.)		32	....	....	25	25	....	50	50	....	50	....	....	.....	1,343	1,343	4,325	4,325	....	....	....	....	4	3	3	3	3	....	....

CAP. 104.

SMALL FRUITS at Experimental Station, Cap Rouge, Que.—*Continued.*

Kind of fruit.	Color.	1911.		1912.		1913.		Number of year planted.	Total plants set.	Died during growing season.	Winterkilled.	Died—per cent.	Yield per acre.				Average Yield per acre for two years.		Rank as to productivity.		Rank as to			
		Planted Spring.	Living Autumn.	Living Spring.	Planted Spring.	Living Autumn.	Living Spring.	Planted Spring.	Living Autumn.					Second year.		Third year.			All plants.	Living.	All plants.	Living.	Earliness.	Size.	Quality.	Appearance.
														All plants.	Living.	All plants.	Living.								
															lb.	lb.	lb.	lb.	lb.	lb.					
Red and White Currants—Con.																									
Parson Beauty (Per.)		....	....	....	50	50	....	47	....	50	13	3	6	549	549	....	....	....	....	....	....	5	4	4	3
Ridgeway (Per.)		....	....	....	25	12	....	7	....	25	....	5	72	109	778	....	....	....	....	....	....	4	1	4	3
Ruby (Per.)		....	....	....	50	50	....	50	....	50	....	....	....	508	508	....	....	....	....	....	....	3	3	3	2
Sample (Imp.)		....	....	....	50	50	....	50	....	50	....	....	....	1,199	1,199	....	....	....	....	....	....	2	2	2	3
Senator Dunlap (Per.)		....	....	....	50	50	....	50	....	50	....	....	....	1,271	1,271	....	....	....	....	....	....	1	3	1	1
Splendid (Per.)		....	....	....	50	50	....	50	....	50	....	....	....	925	925	....	....	....	....	....	....	6	5	5	3
3 Ws (Per.)		....	....	....	50	50	....	50	....	50	....	....	....	1,055	1,055	....	....	....	....	....	....	5	6	6	3
Uncle Jim (Per.)		....	....	....	50	50	....	50	....	50	....	....	....	1,380	1,380	....	....	....	....	....	....	7	7	7	3
William Belt (Per.)		....	....	....	50	50	....	50	....	50	....	....	....	1,506	1,506	....	....	....	....	....	....	8	8	8	3

It will be noted that the total area in the fruits is 12·64 acres whilst the small fruits cover ·98 acre, the total in fruit being 13·62 acres.

There are a couple of thousand apple grafts, a couple of hundred currant and gooseberry cuttings, about twelve hundred raspberry canes, and a few hundred strawberry plants ready to be distributed in the spring of 1914. Our work will thus not only consist in testing varieties, but in distributing the best of those grown at this Station to farmers of this district, and have these varieties tested by co-operators.

VEGETABLES.

Variety tests.—Three hundred and sixty-four varieties of vegetables were tested in 1913. For many of these, separate records had to be kept regarding different spaces between plants, so that it can easily be seen that the horticultural branch is an important one at this Station.

The following tables give more detailed information.

BEANS.

Thirty-six strains or varieties were tested. In this district, the bush or dwarf varieties are much more popular than the pole or climbing ones; for garden purposes, the Lima is practically unknown, the Kidney being universally used; and for the table the yellow-podded or butter sorts are preferred to the green-podded ones. It is interesting to note that the variety which is at the head, both for yield and earliness, Challenge Black Wax, is out of seed saved at this Station in 1912 from a single plant. The other varieties to be recommended in the district are Davis Wax, Keeney's Rustless Wax, and Wardwell's Kidney Wax.

Name.	Seed from	Sown.	Planted.	Ready for Use.	Rank as to Yield.	Rank as to Earliness.
Bountiful	G.	May 26		July 26	29	3
Challenge Black Wax	C.E.F.	" 26		" 21	27	1
Challenge Black Wax	C.R.	" 26		" 21	25	1
Challenge Black Wax	From one plant	" 26		" 21	1	1
Davis Wax	" " "	" 26		" 26	11	4
Davis Wax	" " "	" 26		" 26	13	4
Davis Wax	" " "	" 26		" 26	15	4
Davis Wax	" " "	" 26		" 26	12	4
Early Refugee	" " "	" 26		" 26	4	4
Early Refugee	" " "	" 26		" 26	10	4
Early Refugee	" " "	" 26		" 26	14	4
Early Refugee	" " "	" 26		" 26	23	4
Early Refugee	" " "	" 26		" 26	3	4
Early Refugee	" " "	" 26		" 26	7	4
Early Refugee	"T.	" 26		" 26	20	4
Hodson Long Pod	H	" 26		Aug. 9	18	7
Keeney's Rustless Wax	From one plant	" 26		July 28	21	5
Keeney's Rustless Wax	" " "	" 26		" 28	8	5
Keeney's Rustless Wax	" " "	" 26		" 28	6	5
Keeney's Rustless Wax	" " "	" 26		" 28	19	5
Keeney's Rustless Wax	" " "	" 26		" 28	29	5
Keeney's Rustless Wax	D.G.F.	" 26		" 28	26	5
Keeney's Rustless Wax	T.	" 26		" 28	22	5
Old Homestead	C.R.	" 26		Aug. 14	12	8
Old Homestead	H. seed 1912	" 26		" 14	2	8
Refugee or 1,000 to 1	" " "	" 26		" 7	17	6
Refugee or 1,000 to 1	" " 1913	" 26		" 7	18	6
Refugee or 1,000 to 1	C.R.	" 26		" 7	19	6
Stringless Green Pod	B. seed 1912	" 26		" 25	28	3
Stringless Green Pod	" 1913	" 26		" 25	31	3
Stringless Green Pod	C.R.	" 26		" 25	30	3
Valentine	T.	May 26		July 26	16	4
Valentine	From one plant	" 26		" 26	19	4
Valentine	" " "	" 26		" 26	24	4
Wardwell's Kidney Wax	T.	" 26		" 23	9	2
Wardwell's Kidney Wax	From on plant	" 26		" 23	5	2

BEETS.

Beets are used nearly exclusively for pickling in the district, and the dark-red kinds are liked best; the round ones are preferred to the oval, half-long, and long. A very early variety would have an advantage, because small ones could be sold in bunches when thinning. The Eclipse was the earliest and the heaviest yielder in 1913; as it conforms to the above requirements, it seems the most desirable.

Name.	Seed from.	Sown.	Planted.	Ready for Use.	Thinned to 2 inches.		Thinned to 4 inches.	
					Rank as to		Rank as to	
					Yield.	Earliness.	Yield.	Earliness.
Black Red Ball	B. seed 1912.	May 24.	.....	July 28...	9	3	10	3
Black Red Ball	B. seed 1913 ..	" 24...	—.....	" 28...	8	3	9	3
Early Blood Red Turnip	V.....	" 24...	.....	" 22...	10	1	8	1
Early Model	B.....	" 24...	.....	" 23...	4	2	5	2
Eclipse	M	" 24...	.....	" 22...	3	1	1	1
Egyptian Dark Red Turnip	V.....	" 24...	.....	" 23...	7	2	4	2
Meteor	J. seed 1912.....	" 24...	.....	" 23...	1	2	6	2
Meteor	J. seed 1913	" 24...	.....	" 23...	5	2	3	2
Ruby Dulcet	J. seed 1912....	" 24...	.....	" 23...	6	2	2	2
Ruby Dulcet	J. seed 1913	" 24...	.....	" 23...	2	2	7	2

BROCCOLI.

White Cape	H	Mar. 22..	June 21...	Sept. 4....	.....	.....	.....	.....

BRUSSELS SPROUTS.

Name.	Seed from.	Sown.	Planted.	Ready for Use.	Rank as to	
					Yield.	Earliness.
Dwarf Improved	D. & F. seed '12	April 5...	June 23.	Sept. 15..	1	1
Dwarf Improved	V. seed 1912. ...	" 5...	" 24...	" 15...	2	1
Dwarf Improved	V. seed 1913 ...	" 5...	" 24 ..	" 15...	3	1

CABBAGE.

The Savoy and Red varieties are not of much importance in this district and could very well be neglected. For commercial purposes, the autumn varieties, such as Succession, can be left aside and only the early and late ones used. Early Jersey Wakefield, once the standard early variety, is now being rapidly pushed aside by Copenhagen Market, which comes only a few days later and is a much better yielder. If something extra early is required, one of the Alpha group, as St. John Day, can be grown. For fall and winter, especially when keeping quality is taken into consideration, nothing can equal the Danish Ballhead group, of which the Extra Amager seems a very good strain.

CAP ROUGE.

CABBAGE.

Name.	Seed from	Sown.	Planted.	Ready for Use.	Rank as to Yield	Rank as to Earliness.
Copenhagen Market	B	Apr. 9	June 10.	Aug. 9	2	5
Copenhagen Market	Ht. seed 1912	" 9	" 10	" 9	1	5
Copenhagen Market	Ht. seed 1913	" 10	" 10	" 7	4	4
Danish Delicatesse	Ht. seed 1913	" 10	" 10	" 16	28	7
Danish Summer Ballhead	Ht. seed 1912	Apr. 9	June 10.	Aug. 18	15	8
Danish Summer Ballhead	Ht. seed 1913	" 10	" 10	" 18	8	8
Danish Roundhead	D. & F. seed '12	" 9	" 10	" 26	19	9
Early Jersey Wakefield	D. & F. seed '12	" 8	" 10	July 31	12	2
Early Jersey Wakefield	V. seed 1912	" 9	" 10	" 31	16	2
Early Jersey Wakefield	V. seed 1913	" 9	" 10	" 31	18	2
Early Paris Market	V. seed 1912	" 9	" 10	" 30	23	1
Early Paris Market	V. seed 1913	" 9	" 10	" 31	22	2
Early Summer	H	" 9	" 10	Aug. 14	5	6
Express	M	" 9	" 10	July 31	17	2
Extra Amager Danish Ballhead	Ht. seed 1912	" 9	" 10	Aug. 30	7	10
Extra Amager Danish Ballhead	Ht. seed 1913	" 10	" 10	" 30	9	10
Extra Early Midsummer Savoy	V. seed 1912	" 9	" 10	" 5	24	3
Extra Early Midsummer Savoy	V. seed 1913	" 9	" 10	" 5	26	3
Flat Swedish	H. seed 1912	" 9	" 10	" 30	14	10
Flat Swedish	H. seed 1913	" 10	" 10	" 30	6	10
Fottler's Improved Brunswick	V	" 9	" 10	" 26	10	9
Improved Amager Danish Ballhead	H	" 10	" 10	" 30	13	10
Large Late Flat Drumhead	V	" 9	" 10	" 30	8	10
Lubeck	D	" 9	" 10	" 18	21	8
Magdeburg	D	" 9	" 10	" 30	15	10
New Early Market	H	" 9	" 10	" 5	3	3
Red Danish Stonehead	Ht. seed 1912	" 9	" 10	" 18	27	8
Red Danish Stonehead	Ht. seed 1913	" 10	" 10	" 18	25	8
Small Erfurt	D	" 9	" 10	" 5	20	3
Winningstadt	D	" 9	" 10	" 16	11	7

CARDOON.

Large Spanish	H	May 26		July 12		

CARROTS.

Of the three forms of carrots, the half-long is generally liked better, in this district, than the short and long. The short generally does not yield enough, and the long is inclined to get woody. The Half Long Chantenay is as early as any, and a good yielder, so that it can very well be recommended.

Name.	Seed from	Sown.	Ready for Use.	Thinned to 2 inches. Rank as to Yield.	Thinned to 2 inches. Rank as to Earliness.	Thinned to 4 inches. Rank as to Yield.	Thinned to 4 inches. Rank as to Earliness.
Chantenay	D. & F.	May 24	July 24	1	1	1	1
Early Scarlet Horn	D. & F.	" 26	" 26	7	2	6	2
French Horn	V. seed 1912	May 24	July 24	6	1	7	1
French Horn	V. seed 1913	" 24	" 24	4	1	6	1
Guerande or Oxheart	D.& F.	" 24	" 24	4	1	3	1
Half Long Chantenay	V. seed 1912	" 24	" 24	5	1	4	1
Half Long Chantenay	V. seed 1913	" 24	" 24	4	1	4	1
Improved Nantes	V. seed 1912	" 24	" 26	7	2	8	2
Improved Nantes	V. seed 1913	" 24	" 26	3	2	9	2
Nantes	D. & F.	" 24	" 26	2	2	5	2

CAULIFLOWER.

This is probably the hardest vegetable to grow profitably in this district, but many failures are no doubt due to poor seed. The Early Snowball seems the best variety to use here, but Veitch's Autumn Giant is a better yielder, and though generally not giving as fine heads as the other, is pressing it very closely. We may have to change our opinion about these after two or three years' tests.

Name.	Seed from	Sown.	Planted.	Ready for Use.	Rank as to	
					Yield.	Earliness.
Danish Giant	Ht. seed 1912	Mar. 27	June 21	Aug. 26	5	4
Danish Giant	Ht. seed 1913	Apr. 10	" 24	Sept. 2	3	5
Early Snowball	V. seed 1912	Mar. 27				
Early Snowball	V. seed 1913	Apr. 5	June 21	Aug. 18	2	1
Extra Selected Early Erfurt	V. seed 1912	Mar. 27	" 21	" 20	6	2
Extra Selected Early Erfurt	V. seed 1913	Apr. 5	" 21	" 23	2	3
Selected Dwarf Erfurt	D. & F.	Mar. 27	" 21	" 23	4	3
Veitch's Autumn Giant	E.	" 27	" 21	Sept. 2	1	5
Veitch's Autumn Giant	M. seed 1912	" 27	" 21	" 2	2	5

CELERIAC.

Large Smooth Prague	H	Mar. 21	July 10			

CELERY.

Of the two kinds, the green varieties, such as Giant Pascal, have completely given way, in this district, to the so-called self-blanching sorts. Seed of this vegetable is always available too late at the Station to compare varieties, and no results have been had for three years, that can be depended upon. Paris Golden Yellow is the variety which enjoys the most popularity at present around here.

Name.	Seed from	Sown.	Planted.	Ready for Use.	Rank as to	
					Yield.	Earliness.
Evans' Triumph	B. seed 1912	March 21	July 10	Oct. 2	6	3
Evans' Triumph	B. seed 1913	" 21	" 10	Sept. 15	1	1
Evans' Triumph	D. & F. seed '12	" 21	" 10	" 24	2	2
French Success	H	" 21	" 10	Oct. 2	3	3
Giant Pascal	V. seed 1912	" 21	" 10	" 7	7	4
Giant Pascal	V. seed 1913	April 5				
Noll's Magnificent	G	March 21	July 10	Oct. 7	5	4
Paris Golden Yellow	V	April 5	" 10			
Rose Ribbed Paris	V	" 5	" 10			
White Plume	T	March 21	July 10	Oct. 2	4	3

CORN

Twenty-five strains and varieties were tested. Unfortunately, in this district, sweet corn is not appreciated as it should be, and some of the field varieties, which have nothing to recommend them but their earliness and the size of their ears, find their way to the tables of people who would pass for epicures. The earliest corn at this Station was a field variety, but the heaviest yielding was Early Malcolm, grown

CAP ROUGE.

from seed saved at this Station in 1912. This variety is a strain of the Malakoff, selected and improved at the Central Experimental Farm, Ottawa. I would recommend it for an early variety, with Golden Bantam for a mid-season, and Country Gentleman, a late variety. Of course, Early Malcolm could be used alone by making successive sowings.

Name.	Seed from	Sown.	Planted.	Ready to use.	Rank as to	
					Yield.	Earliness.
Black Mexican	R. seed 1912	June 6		Sept. 25	7	11
Black Mexican	R. seed 1913	" 6		" 25	7	11
Canadian	Cantin	" 6	"	Aug. 30	5	3
Canadian	Hudon	" 6		" 20	6	1
Country Gentlemen	B. seed 1913	" 6		Sept. 30	9	12
"	D. & F. seed 1912	" 6		" 30	9	12
Early Evergreen	D	" 6		" 25	8	11
Early Iowa	Vn	" 6		" 4	6	5
Early Malcolm	C.E.F. seed 1912	" 6		Aug. 30	2	3
"	" 1913	" 6		" 30	4	3
"	C.E.F. distribution 1913	" 6		" 30	3	3
"	C.R. from one plant	" 6		" 26	1	2
"	C.R	" 6		" 30	1	3
Extra Early Adams	R	" 6		Sept. 8	4	6
Fordhook Early	B. seed 1912	" 6		" 4	7	5
"	B. seed 1913	" 6		" 1	5	4
Golden Bantam	B. seed 1913	" 6		" 10	6	9
"	D. & F. seed 1912	" 6		" 10	7	9
Golden Rod	H	" 6		" 15	5	10
Metropolitan	"	" 6		" 30	8	12
Perkins Early	J	" 6		" 15	7	10
Perry's Hybrid	D. & F. Max	" 6		" 25	5	11
Ste. Flore	St. Louis	" 6		Aug. 26	3	2
Stowell's Evergreen	G	" 6				
White Cob. Cory	H	" 6		Sept. 1	3	4

CUCUMBERS.

This is one of the important vegetables of this district because, besides the large numbers eaten green, practically every farmer pickles some to be used from one end of the year to the other. The Chicago Pickling has done best here amongst the small varieties: for the large ones, the Early White Spine, though not at the head this year for yield or earliness, is to be specially commended on account of its quality and good shape, which are two important considerations for the market.

Name	Seed from.	Sown.	Planted.	Ready to use.	Rank as to Yield.	Rank as to Earliness.
Boston Pickling	D. & F.	May 31		Aug. 5	3	1
Chicago Pickling	C. R.	" 31		" 7	4	2
Cool and Crisp	H	" 31		" 16	8	6
Davis Perfect	D. & F.	" 31		" 12	3	4
Early Short Green	C. R.	" 31		" 12	5	4
Early White Spine	"	" 31		" 20	10	7
Extra Early Russian	R.	" 31		" 9	1	3
Giant Pera	B. seed 1912	May 31		" 14	6	5
"	B. seed 1913	" 31		" 16	7	6
Peerless White Spine	J. seed 1912	" 31	"	" 12	2	4
"	J. seed 1913	" 31		" 12	3	4
Prize Pickling	R.	" 31		" 12	9	4

EGG PLANT.

Black Beauty	H	Mar. 28	June 23			
New York Improved	T.	" 22	" 23	Sept. 30	1	1

ENDIVE.

Green Curled	H.	April 25		June 21		

KALE.

Dwarf Green	H	May 26		July 15		

KOHL RABI.

Early White	H	May 26		July 28		

LEEK.

American Flag	E. seed 1913	April 25		July 15	1	1
"	H. seed 1912	" 25		" 15	2	1

LETTUCE.

Twenty strains and varieties of lettuce were tested. In this district, the Cos varieties are hardly known, whilst the curled ones are losing popularity all the time except for forcing in winter; the "head" or "cabbage" sorts are demanded, the butter sub-classes bringing a better price than the crisp ones. It is interesting to note that our strain of Victoria was surpassed by none for yield. Victoria and All Heart seem to catch our markets well, and our work, with the first named, consists in selecting plants which are late in coming to seed.

Name.	Seed from	Sown.	Planted.	Ready for use.	Rank as to	
					Yield.	Earliness.
All Heart	D	April 24		June 14	3	2
Big Boston	H	" 24		" 26	6	7
Black Seeded Simpson	D. & F. seed 1912	" 24		" 14	2	2
"	T. seed 1912	" 24		" 12	1	1
"	T. seed 1913	" 24		" 18	3	4
Crisp as Ice	Vs	" 24		" 26	4	7
Dark Green Capucine	V	" 24		" 24	3	6
Giant Crystal Head	T	" 24		" 14	1	2
Grand Rapids	D. & F. seed 1912	" 24		" 21	1	5
"	T. seed 1912	" 24		" 21	3	5
"	T. seed 1913	" 24		" 21	6	5
Iceberg	B. seed 1913	" 24		" 26	6	7
"	D. & F. seed 1912	" 24		" 16	1	3
Improved Hanson	D. & F. seed 1912	" 24		" 14	1	2
"	T. seed 1912	" 24		" 14	1	2
"	T. seed 1913	" 24		" 14	2	2
Rousseau Blond Winter	V	" 24		" 24	7	6
Unrivalled Summer	V	" 24		" 24	5	6
Victoria	From one plant	" 24		" 16	1	3
"	V	" 24		" 16	4	3

MARTYNIA.

Proboscidea	H	May 26		Aug. 18		

MUSK MELON.

Earliest Ripe	S	May 30				
Emerald Gem	B	" 30				
Extra Early Green Citron	C.R	" 30				
Hackensack	H. seed 1912	" 30				
"	H. seed 1913	" 30				
"	D. & F. seed 1912	" 30				
Hoodoo	I	" 30				
Montreal Market	E	" 30				
"	C.R	" 30				
Paul Rose	B. seed 1912	" 30				
"	B. seed 1913	" 30				
Rocky Ford	C.R	" 30				

ONIONS.

The red varieties are more popular in this district than the yellow ones, and the Wethersfield is the one to be recommended. A strain of this variety was the earliest ready for market, and the best yielder, in 1913, of eleven strains and varieties tested. An advantage of the red varieties over the yellow ones is that, in this climate, they keep better through winter.

Name.	Seed from	Sown.	Planted.	Ready for use.	Rank as to Yield.		Rank as to Earliness.	
					Yield.	Earliness.	Yield.	Earliness.
Danvers Yellow Globe	D. & F. seed 1912	April 24		July 12	6	1	6	1
" "	V. seed 1912	" 24		" 14	10	2	9	2
" "	V. seed 1913	" 24		" 15	9	3	10	3
Dark Red Beauty	J	" 24		" 18	8	4	11	4
Extra Early Red	R	" 24		" 12	3	1	2	1
Prizetaker	D. & F.	" 24		" 15	7	3	8	3
Wethersfield Red	D. & F. seed 1912	" 24		" 12	1	1	1	1
Wethersfield, Salzers	S. seed 1912	" 24		" 14	5	2	3	2
" "	S. seed 1913	" 24		" 12	4	1	5	1
Wethersfield Large, Red	V. seed 1912	" 24		" 12	2	1	7	1
" " "	V. seed 1913	" 24		" 12	6	1	4	1

PARSLEY.

Carter's Fern Leaved	M	April 24		July 12	1		2	
Double Curled	G. seed 1912	" 24		" 5	2		1	
"	T. seed 1912	" 24		" 5	5		1	
Double Curled	T. seed 1913	" 24		" 5	3		1	
Emerald	H	" 24		" 5	4		1	

PARSNIPS.

Name.	Seed from	Sown.	Planted.	Ready for use.	Thinned to 2 inches. Rank as to Yield	Thinned to 2 inches. Rank as to Earliness.	Thinned to 4 inches. Rank as to Yield	Thinned to 4 inches. Rank as to Earliness.
Hollow Crown	D. & F. seed 1912	May 26		Aug. 9	3	1	2	1
"	G. seed 1912	" 26		" 9	2	1	4	1
"	G. seed 1913	" 26		" 9	1	1	1	1
New Maltese	M	" 26		" 9	4	1	3	1

PEAS.

The wrinkled sorts generally are better liked than the smooth ones, and the dwarf, also the half dwarf are more popular with farmers than the tall ones. The very early varieties are to be recommended as, by successive sowings, a constant supply can be had through the season. Gregory's Surprise is probably the best for this district on account of its earliness, though old standard varieties like Stratagem, Heroine, and Telephone yield a little more. Garden peas are not nearly as popular here as they should be. It is interesting to note that our strain of Surprise was the earliest and Stratagem the heaviest yielder of fifty-two strains and varieties tested in 1913.

Name.	Seed from	Sown.	Planted.	Ready to use.	Rank as to	
					Yield.	Earliness.
American Wonder	T.	May 30		July 22	15	2
Gradus	B.	" 30		" 23	12	3
Heroine	From one plant	" 30		Aug. 6	2	11
"	"	" 30		" 5	8	10
"	"	" 30		" 5	9	10
"	"	" 30		" 5	9	10
"	"	" 30		" 5	9	10
"	M	" 30		" 5	13	9
Juno	T. seed 1912	" 30		" 5	14	10
"	T. seed 1913	" 30		" 5	16	10
"	From one plant	" 30		" 5	6	10
"	"	" 30		" 5	10	10
"	"	" 30		" 5	11	10
"	"	" 30		" 5	11	10
"	"	" 30		" 5	9	10
"	"	" 30		" 5	15	10
"	"	" 30		" 5	9	10
McLean's Advancer	T. seed 1912	" 30		July 26	18	5
"	T. seed 1913	" 30		" 26	13	5
"	From one plant	" 30		" 26	4	5
"	"	" 30		" 26	4	5
"	"	" 30		" 26	6	5
"	"	" 30		" 26	8	5
"	"	" 30		" 26	8	5
"	"	" 30		" 26	10	5
Nott's New Perfection	Me	" 30		" 22	15	2
Premium Gem	T. seed 1912	" 30		" 23	7	3
"	T. seed 1913	" 30		" 24	19	4
Stratagem	T.	" 30		" 30	12	7
"	From one plant	" 30		" 31	1	8
"	"	" 30		" 31	3	8
"	"	" 30		" 31	7	8
"	"	" 30		" 31	5	8
"	"	" 30		" 31	11	8
Gregory's Surprise	G. seed 1912	" 30		" 19	20	1
" "	G. seed 1912	" 30		" 19	21	1
" "	G. seed 1913	" 30		" 19	21	1
Gregory's Surprise	From one plant	May 30		July 19	11	1
" "	"	" 30		" 19	11	1
" "	"	" 30		" 19	17	1
" "	"	" 30		" 19	17	1
" "	"	" 30		" 19	17	1
Sutton's Excelsior	D.	" 30		" 28	12	6
Telephone	T.	" 30		" 31	13	8
"	From one plant	" 30		" 31	4	8
"	"	" 30		" 31	8	8
"	"	" 30		" 31	8	8
"	"	" 30		" 31	10	8
"	"	" 30		Aug. 2	10	9
"	"	" 30		" 2	8	9
Thos. Laxton	Br. seed 1912	" 30		July 19	10	1
"	" 1913	" 30		" 19	15	1

PEPPER.

Name.	Seed from.	Sown.	Planted.	Ready to Use.	Rank as to	
					Yield.	Earliness.
Cayenne Red	D. & F. Seed 1912	Mar 22				
"	J. seed 1912	" 22	June 16	Sept. 2	2	2
Cayenne	" 1913	" 22	" 16	" 8	3	3
Chili	G. seed 1912	" 22	" 16	" 10	4	4
"	T. seed 1913	" 22	" 16	" 15	4	5
Neapolitan Early	J. seed 1912	" 22	" 16	Aug. 29	1	1
" "	" 1913	" 22	" 16	" 29	1	1
" New	From one plant	" 22	" 16	Sept. 10	5	4
" "	"	" 22	" 16	Aug. 29	1	1

POTATOES.

Of eighteen varieties tested, the Irish Cobbler was the earliest and Table Talk the heaviest yielder. It is too early yet, after only three years, to say which variety should be recommended. No doubt, the Irish Cobbler is bound to be popular near cities, where an early crop is always a paying one. But the best-liked sorts are those of the Carman type which can nearly always be depended upon to yield well and which are also better keepers, in cellars, through winter, than the earlier sorts.

Name.	Seed from.	Sown.	Planted.	Ready to use.	Rank as to	
					Yield.	Earliness.
American Wonder	C. R.	June 7		Aug. 15	8	2
Rawlings Kidney (Ashleaf Kidney)	"	" 7		" 18	5	3
Carman No. 1	"	" 7		" 15	12	2
Dalmeny Beauty	"	" 7		" 15	14	3
Dreer's Standard	"	" 7		" 15	10	2
Empire State	"	" 7		" 18	11	3
Everett	"	" 7		" 21	7	4
Factor	"	" 7		" 21	12	4
Gold Coin	"	" 7		" 15	4	2
Hard to Beat	"	" 7		" 21	9	4
Irish Cobbler	"	" 7		" 12	4	1
Late Puritan	"	" 7		" 18	12	3
Money Maker	"	" 7		" 15	6	2
Morgan Seedling	"	" 7		" 15	13	2
Rochester Rose	"	" 7		" 18	3	3
Table Talk	"	" 7		" 18	1	3
Vick's Extra Early	"	" 7		" 18	6	3
Wee McGregor	C.E.F	" 7		" 18	2	3

RADISHES.

Of the turnip-shaped, oval, and long varieties, the first are the best liked in this district; amongst the early, autumn, and winter sorts, the two latter are hardly known; and between the scarlet and white, the coloured ones appeal most to the consumer. The Early White Tipped Scarlet Turnip is probably the one which should

be recommended. However, the White Icicle, though its shape and colour are against it, is forging ahead rapidly because it is a heavy yielder and especially because it does not become woody so soon as the others. Our strain of White Icicle was the heaviest yielder of ten strains and varieties tested in 1913.

Name.	Seed from.	Sown.	Planted.	Ready to use.	Rank as to	
					Yield.	Earliness
Forcing Turnip Scarlet	V. seed 1912	April 24		May 26	2	1
Forcing Turnip Scarlet White Tipped	" 1913	" 24		" 26	6	1
Turnip Early Scarlet White Tipped	D. & F. seed 1912	" 24		" 26	5	1
Turnip Early Scarlet White Tipped	D. & F. seed 1913	" 24		" 26	4	1
Turnip Early Scarlet White Tipped	V. seed 1912	" 24		" 26	8	1
Turnip Early Scarlet White Tipped	" 1913	" 24		" 26	7	1
White Icicle	D. & F.	" 24		" 29	9	2
"	From one plant	" 24		" 29	3	2
"	"	" 24		" 29	3	2
"	"	" 24		" 29	1	2
SALSIFY.						
Long White	R. seed 1912	May 26		July 28	2	1
"	" 1913	" 26		" 28	1	1
SPINACH.						
Victoria	D. & F.	April 25		June 18		

SQUASH.

The summer varieties are as popular in this district as the autumn ones, as they are used mainly to preserve, and this can be done as soon as the crop is harvested. As to form, the crooknecks are not liked because there is too much loss and not enough flesh; between the "patty pan" and "long" sorts, the latter are the most popular, peeling with less waste. The bush varieties are certainly an improvement over the trailing ones which unnecessarily take too much room in the ordinary limited area of a garden. The Long White Bush Marrow, though not one of the "showy" kinds, is the one which should be recommended.

Name.	Seed from.	Sown.	Planted.	Ready to use.	Rank as to	
					Yield.	Earliness
Custard Marrow White Bush Scallop	V. seed 1912	June 4		Aug 30	13	7
Custard Marrow White Bush Scallop	" 1913	" 4		Sept. 2	14	8
Delicata	T.	" 4		" 6	9	10
Delicious	G. seed 1912	" 4		" 4	8	9
"	M. seed 1913	" 4		" 2	9	8
Golden Hubbard	M	" 4		Aug. 25	15	5
Hubbard	V.	" 4		" 28	10	6
Improved Hubbard	D. & F.	" 4		" 28	7	6
Long Vegetable Marrow	V. seed 1912	" 4		" 18	2	4
" "	V. " 1913	" 4		" 15	1	2
Long White Bush Marrow	V. " 1912	" 4		" 14	5	1
" "	V. " 1913	" 4		" 14	6	1
" "	From one plant	" 4		" 18	11	4
Mammoth Whale	V. D. & F.	" 4		" 28	4	6
Summer Crookneck	D. & F. seed 1912	" 4		" 28	9	6
"	R. seed 1913	" 4		" 28	13	6
Trailing White Vegetable Marrow	C.	" 4		" 16	3	3
White Bush Scalloped	D. & F.	" 4		" 28	6	6
White Congo	V.	" 4				

TOMATOES.

Twenty-nine strains and varieties were tested in 1913. For this district, the most important consideration is earliness, as it is useless to grow a late variety, however good it may be, which will not mature a fairly large percentage of its fruit. There seems no doubt that the better strains of the Earliana are to be particularly recommended; the Alacrity, which is a strain of the Earliana specially selected at the Central Experimental Farm, Ottawa, is the most promising which we have. Some interest is shown in the small yellow tomatoes for preserves, and the variety known as Yellow Plum succeeds well here.

Name.	Seed from.	Sown.	Planted.	Ready to use.	Rank as to	
					Yield.	Earliness
Alacrity 2-24-9	C. E. F.	Mar 22	June 6	Aug. 25	17	3
Alacrity 2-24-10	"	" 22	" 6	" 25	13	3
Bonny Best	Hs. seed 1912	" 22	" 6	Sept. 6	24	8
"	" 1913	" 22	" 6	" 4	19	7
"	From one plant	" 22	" 6	" 1	21	5
Chalk's Early Jewel	B. seed 1912	" 22	" 6	" 2	26	6
" "	" 1913	" 22	" 6	" 4	27	7
" "	D. & F. seed 1912.	" 22	" 6	" 4	22	7
Earliana, Northern Adirondack	L.	" 22	" 6	Aug. 25	9	3
" "	From one plant	" 22	" 6	" 25	6	3
" Sparks	C.E.F. seed 1912	" 22	" 6	" 28	16	4
" " 12-18	C.E.F. seed 1912	" 22	" 6	" 25	1	3
" " 12-13	" "	" 22	" 6	" 25	7	3
" "	From one plant	" 22	" 6	" 28	3	4
" "	" "	" 22	" 6	" 28	14	4
" "	" "	" 22	" 6	" 21	4	2
" Sunnybrook Strain	B. seed 1912	" 22	" 6	" 28	15	4
"	" 1913	" 22	" 6	" 28	5	4
Earlibell	S.	" 22	" 6	" 25	10	3
Earliest of All	C. R.	" 22	" 6	" 28	18	4
Florida Special	Bo	" 22	" 6	Sept. 10	23	9
I. X.-4	Bo.	" 22	" 6	Aug. 25	8	3
Matchless	Bo.	" 22	" 6			
Prosperity	Bo.	" 22	" 6	Aug. 18	2	1
Rennie's XXX Earliest	B. seed 1912	" 22	" 6	" 28	20	4
"	" 1913	" 22	" 6	" 21	11	2
"	C.R. from one plant	" 22	" 6	" 28	12	4
Yellow Husk or Strawberry	H.	" 22	July 9			
Yellow Plum	D. & F.	" 22	June 6	Aug. 28	25	4

TURNIPS.

There is practically no market for turnips in the district, as consumers do not like their bitter taste, and buy swedes instead. The only exception would be for the very early season when small vegetables sell in bunches. For this, the Purple Top Milan is the best variety. It was the first one ready for market and the best yielder at this Station in 1913.

Name.	Seed from.	Sown.	Planted.	Ready for use.	Thinned to 2 inches.		Thinned to 4 inches.	
					Rank as to		Rank as to	
					Yield	Earliness.	Yield.	Earliness.
Strap Leaved Early White Flat	V. seed 1912	May 26		July 19	3	3	2	3
Strap Leaved Early White Flat	" 1913	" 26		" 19	3	3	1	3
Extra Early Milan	D.& F. seed 1912	" 26		" 15	4	2	4	2
"	V. seed 1913	" 26		" 12	2	1	5	1
Favorite Swede	D. & F.	" 26		Aug. 2	Thinned to six inches.			
Purple Top Milan	H.	" 26		July 12	1	1	3	1

WATERMELON.

Watermelons are a southern product and will never be grown with profit in this district because, to be relished, they must be eaten during warm weather and they are only fit for use late in the season around here. Phinney's Early was both the heaviest yielder and the earliest, in 1913, and it must be remarked that this distinction belonged to a strain developed here.

Name.	Seed from.	Sown.	Planted.	Ready for use.	Rank as to	
					Yield.	Earliness.
Cole's Early	G. seed 1912	May 30		Sept. 17	6	2
"	G " 1913	" 30				
"	From one plant	" 30		" 15	5	1
Florida Favorite	H	" 30		" 17	2	
Ice Cream	R	" 30				
Phinney's Early	B.	" 30		" 15	4	1
"	From one plant	" 30		" 15	1	1
Salzer's Earliest	S. seed 1912	" 30		" 17	8	2
"	" 1913	" 30		" 15	3	1
"	From one plant	" 30		" 15	7	1

WITLOOF CHICORY.

Witloof Chicory	H.	May 26		Sept. 6		

MISCELLANEOUS.

Besides the above, we grew in 1913 one variety of broccoli, three strains of Brussels sprouts, one variety of cardoon, one of celeriac, two of egg plant, one of endive, one of kale, one of kohl rabi, two strains of leek, one variety of martynia, five strains and varieties of parsley, two of parsnip, nine of pepper, two strains of salsify, one variety of spinach, and one of whitloof.

The Dwarf Improved, for Brussels sprouts, New York Improved, for egg plants, Double Curled for parsley, Hollow Crown for parsnips, New Neapolitan, for peppers, are the varieties which do best here.

SEED GROWING.

Besides these variety tests, nearly 3 acres were used for seed production and for market. Early Malcolm corn (a strain of Malakoff selected at the Central Experimental Farm, Ottawa), Alacrity tomato (another selected strain of the Earliana from C.E.F.) and Surprise peas are grown to produce seed to be distributed to farmers of the district. Last year, 372 samples of corn and 204 of tomatoes were sent out. This year 400 samples of corn, 400 of tomatoes and 700 of peas can be distributed.

SEED DISTRIBUTION.

When shipping these samples a letter is sent saying that if the person who receives the seed is not interested enough to answer yes or no to a few questions on an enclosed sheet and to send this in the autumn, his name will be taken off the lists. If the distribution were made of seeds bought in large quantities from merchants, it would not be so important, but it is believed that when seed grown in the district, well cleaned, pure, of specially selected strains, is sent out, it should fall only into the hands of men who are interested enough to become co-operators: moreover, this co-operation of theirs entitles them to the distribution another year. The questions asked are generally to know how other varieties tried compare with the one sent out for: (*a*) earliness, (*b*) uniformity, (*c*) yield, (*d*) quality. When a man reports that he has something better than what he received from this Station, we correspond with him and try to get seed to test here.

MARKETING.

There are those in this district who believe that farmers could get a great deal more for their vegetables if more care were taken to prepare the goods for market. For a couple of years past vegetables have been sold from this station, especially in Quebec city, in what is known as a "home hamper." This is a light crate containing half a dozen six-quart baskets in which different varieties of vegetables are put, wrapped up in a green paraffine paper. This autumn, the home hampers retailed at $1.50. The vegetables which they contained, sold in bulk as generally done, would have brought 60 cents and the hamper, paper, etc., cost about 40 cents. Even counting the extra time used in washing and packing, it is easy to see that it paid to put the goods on the market in fine shape.

CAP ROUGE.

SESSIONAL PAPER No. 16

ORNAMENTAL GARDENING.

HEDGES.

Fifteen different kinds of hedges were planted since 1911, but it is yet too early to say which will give most satisfaction. The white spruce had to be replaced, as most trees had died.

CONIFERS.

Twenty-five varieties of conifers are on test on the ornamental grounds, but so far few of them have done well.

The following table gives further details:

Name.		Planted.	Winter-killed.	Died during growing season.	Condition. Autumn of 1913.		
Botanical.	Common.				Good.	Medium	Poor.
Abies concolor	Silver fir	2	2				
Cupressus ericoides	Japanese cedar	5	1	2			2 (N)
" *pisifera aurea*	Golden Sawara cypress	2		2			
" " *filifera*	Japanese thread-branched cedar	4	2	2			
Cupressus pisifera plumosa—*Plumose Retinospora*	Plumose Retinospora	5		2	3 (N)		
Cupressus pisifera plumosa aurea	Golden *Plumose Retinospora*	3			3 (N)		
Ginkgo biloba	Maiden-hair tree	2			2 (N)		
Juniperus communis fastigiata	Irish juniper	2			2		
Larix europaea	European larch	5		2	3 (N)		
Picea canadensis	White spruce	2		2			
Picea Alcockiana	Alcock's spruce	2	1			1	
Picea excelsa	Norway spruce	8	3	2	2 (N)	1 (N)	
Picea pungens	Rocky Mountain blue spruce	1	1				
" " *glauca*	Colorado blue spruce	2	1				
Pinus Laricio nigricans	Austrian pine	1	1				
" *montana*	Mountain pine	3	3				
" " *Mughus*	Dwarf mountain pine	2		2			
" *ponderosa*	Heavy-wooded pine, orbull pine	1		1			
" *resinosa*	Red pine	1		1			
" *Strobus*	White pine	1		1			
" *sylvestris*	Scotch pine	1		1			
Pseudotsuga Douglasii	Douglas' fir	2		2			
Taxus cuspidata	Japanese yew	2			2 (N)		
Thuya occidentalis	White cedar, or American arbor vitæ	6			6 (N)		
" *Douglasii*							
" " *aurea*	Douglas' golden arbor vitæ	2	1		1		
" " *compacta*	Compact arbor vitæ	5	2		3 (N)		
" " *Ellwangeriana*	Ellwanger's arbor vitæ	2	2				
" " *globosa*	Globose arbor vitæ	2		2			
" " *Hoveii*	Hovey's arbor vitæ	2	1		1		
" " *pyramidalis*	Pyramidal arbor vitæ	6			6		
" " *Wareana*	Siberian arbor vitæ	2	2				

DECIDUOUS TREES AND SHRUBS.

One hundred and nine varieties of deciduous trees and shrubs are planted on the ornamental grounds, and most of them have done well. Only a few were winter-killed, and the living ones will make a splendid show when a few years older.

Details will be found about them in the following table:—

Name.		Planted.	Winter-killed.	Died during growing season.	Autumn of 1913, condition.			1913, Bloomed.	
Botanical.	Common.				Good.	Medium.	Poor.	From	To
Acer saccharinum laciniatum Wieri	Wier's cut-leaved maple	1			1				
" *platanoides*	Norway maple	2			2				
" " *Schwedleri*	Schwedler's maple	3	2		1				
" *tataricum Ginnala*	Ginnalian maple	4			4				
Aesculus Hippocastanum	Horse chestnut	1			1				
Amorpha fruticosa	False indigo	5			5			July 15	July 31
Ampelopsis quinquefolia	Virginian creeper	7			7				
Aristolochia Sipho	Dutchman's pipe	3				3			
Berberis Aquifolium	Oregon grape	2			2				
" *Thunbergii*	Thunberg's barberry	2		2					
Betula alba	European white birch	2		2					
" *pyramidalis*	Pyramidal birch	3				3			
Caragana arborescens	Siberian pea tree	16	2	2	12				
" *frutescens macrophylla*	Woody caragana	4			1	1	2		
" *grandiflora*	Large-flowered caragana	3			3				
" *pygmaea*	Dwarf caragana	3		2	1				
Carya alba	Shagbark hickory	2			2				
Catalpa Kaempferi	Japanese catalpa	2			2				
" *speciosa*	Catawba tree	2			2				
Celastrus articulatus	Japanese bitter-sweet	10	1		9				
" *scandens*	Climbing bitter-sweet	1		1					
Clematis vitalba	Common traveller's joy	2		1	1				
Cornus alba sibirica	Siberian dogwood	20			20				
Cornus alba sibirica variegata	Variegated Siberian dogwood	7	2		2	3			
Crataegus Crus-galli	Cockspur thorn	2			2				
Cytisus nigricans	Summer-flowering cytisus	3					3		
" *purpureus*	Purple broom	2							
Daphne Cneorum	Garland flower	2			2				
Diervilla hybrida Eva Rathke	Weigelia	3			3				
Elaeagnus angustifolia	Russian olive	2			2				
Euonymus europaeus	Common spindle tree	2			2				
Forsythia intermedia	Golden bell	3			3				
Gleditschia triacanthos	Honey locust	3			3				
Hippophae rhamnoides	Common sea buckthorn	2		1	1				
Hydrangea arborescens	Plumed hydrangea	2			2				
" *paniculata grandiflora*	Large-flowered hydrangea	25							
Juglans Sieboldiana	Japanese walnut	1			1				
Lespedeza bicolor	Shrubby bush clover	2			2				
Ligustrum amurense	Amur Privet	2			2				
Lonicera Albertii	Albert Regal's honeysuckle	2		2					
" *Morrowi*	Japanese honeysuckle	3	1		2				
" *punicea*	Honeysuckle	4					4		
" *tatarica*	Tartarian honeysuckle	2			2				
" " *flore roseo*	Rose-floweredhoneysuckle	3			3		4	June 1	June 15
" " *grandiflora alba*	Tartarian honeysuckle	3			3			May 30	June 17
" *virginalis alba*	White honeysuckle	3			3			May 30	June 16
Neillia opulifolia aurea	Golden-leaved ninebark	6			6			July 1	July 25
Philadelphus, Bouquet Blanc	Mock orange	2			2			July 7	July 25
" *coronarius*	Common mock orange	2			2				
" *coronarius foliis aureis*	Golden-leaved mock orange	1	1						
" *grandiflorus speciosissimus*	Large-flowered mock orange	2			2			June 30	July 30

CAP ROUGE.

DECIDUOUS TREES AND SHRUBS.—*Concluded.*

Name.		Planted.	Winter-killed	Died during growing season.	Autumn of 1913, condition.			1913, Bloomed.	
Botanical.	Common.				Good.	Medium.	Poor.	From	To
Philadelphus, nivalis	Mock orange	6			6			July 14	Aug. 7
" *Satsumi*	Mock orange	5			5			July 1	July 30
" *speciosissimus*	Mock orange	5		2	3			June 30	July 30
Populus angulata cordata robusta	Cottonwood	3			3				
Potentilla fruticosa	Shrubby cinque-foil	2			2			May 15	Sept. 15
Prunus Grayana	Ornamental cherry	2			2				
Ptelea trifoliata	Wafer ash	3	1		2				
" " *aurea*	Golden wafer ash	1			1				
Pyrus angustifolia	Wild crab apple	4			3		1		
Pyrus Aucuparia	European mountain ash	2			2				
Quercus imbricaria	Shingle oak	2			2				
" *palustris*	Pin oak	5			4		1		
" *rubra*	Red oak	2			2				
Rhamnus cathartica	Common buckthorn	47			47				
" *Frangula*	Alder buckthorn	1			1				
Rhus Cotinus atropurpureus	Smoke tree	2			2				
Ribes aureum	Missouri currant	2			2				
Robinia hispida	Rose acacia	5							
Salix rosmarinifolia	Rosemary-leaved willow	14			14		(Two Killed Back)		
Sambucus nigra foliis aureis	Golden-leaved black-fruited elder	4			4				
Spiræa arguta	Early spiræa	2			2				
" *bracteata*	Round-leaved spiræa	2			2				
" *callosa*	Japanese spiræa	2			2			July 25	Sept. 1
" *japonica callosa*	Japanese spiræa	1			1			Aug. 6	Aug. 25
" *Margaritæ*		3			3			July 28	Aug. 15
" *salicifolia*	Meadow sweet	2			2			July 28	Aug. 15
" *Van Houttei*	Van Houtte's spiræa	38			38			June 7	July 1
Symphoricarpus racemosus	Snowberry	2			2			July 12	Sept. 7
Syringa amurensis	Amur lilac	13			13				
" *chinensis rothomagensis*	Rouen lilac	2			2				
" *japonica*	Japan lilac	2	1			1			
" *Josikæa*	Josika's lilac	5	1		4				
" *villosa*	Himalayan lilac	5			5			June 12	June 30
Madame Casimir Perier		2			2				
" *vulgaris alba grandiflora*	Large-flowered white lilac	4			4				
" *vulgaris* Charles X	Common lilac	5	1		4				
" *vulgaris* Congo	" "	2			2			May 30	June 16
" *vulgaris* Jacques Calot	" "	5			5			June 2	June 17
Syringa vulgaris Leon Simon	Common lilac	2			2			May 30	June 16
" " Ludwig Spath	" "	6			6			May 30	June 17
" " Marc Micheli	" "	2					2		
" " Mlle. Fernande Viger	" "	6	1		5		(One Killed Back).		
" " Michel Buchner	" "	5		1	2	2			
Viburnum dentatum		3			3				
" *Lantana*	Wayfaring tree	9		6	3				
" *molle*	Soft-leaved arrowwood	3			3				
" *Opulus*	High-bush cranberry	2			2				
" " *sterile*	Snowball	7			7			June 10	July 1

ROSES.

Forty-seven varieties of roses are tried, to see which will best resist our hard winters, and these will no doubt make a splendid display on the grounds within a couple of years.

The following list shows which are the hardiest:—

Name.		Planted.	Winter killed.	Died during growing season.	Autumn, 1913, condition.			1913, bloomed.	
Botanical.	Common.				Good	Medium	Poor	From	to
Climbing	Tausendschon	1	....	1	....	....	....	....	....
	A. K. Williams	2	....	2	....	....	....	....	....
	Barbarossa	2	....	2	....	....	....	....	....
	Baronne de Rothschild	2	....	....	2	....	....	July 10	Sept. 1
	Frau Karl Druschki	2	....	1	1	....	....	July 25	Oct. 1
	Her Majesty	2	....	1	1	....	....	....	....
	Hugh Dickson	2	....	....	2	....	....	July 16	Aug. 3
	John Hopper	2	1	....	1	....	....	Aug. 20	Sept.20
	Jules Margottin	2	....	1	1	....	....	....	....
	Mabel Morrison	2	....	....	2	....	....	July 15	July 26
	Mme. Gabriel Luizet	2	1	....	1	....	....	....	....
	Merveille de Lyon	2	....	....	2	....	....	July 9	Aug. 16
	Victor Verdier	2	....	....	2	....	....	July 9	Aug. 22
H. T.	Antoine Rivoire	1	....	1	....	....	....	....	....
	Betty	1	....	....	....	....	1	....	....
	Caroline Testout	1	....	1	....	....	....	....	....
	Dean Hole	1	....	....	1	....	....	July 9	Sept. 1
	Etoile de France	1	....	....	....	....	....	Run to	briar.
	Gruss an Teplitz	1	....	....	1	....	....	July 31	Sept. 1
	Killarney	1	....	....	1	....	....	July 30	Sept. 1
	La France	1	....	1	....	....	....	....	....
	Mme. Abel Chantenay	1	....	1	....	....	....	....	....
	Mme. Ravary	1	....	1	....	....	....	....	....
	Mildred Grant	1	....	1	....	....	....	....	....
	Mrs. Aaron Ward	1	....	1	....	....	....	....	....
	My Maryland	1	....	1	....	....	....	....	....
	Radiance	1	....	1	....	....	....	....	....
	Theresa	1	....	1	....	....	....	....	....
	White Killarney	1	....	1	....	....	....	....	....
Moss	Common Moss	1	....	....	1	....	....	....	....
Pernetiana	Lyon Rose	1	....	....	1	....	....	July 16	Sept. 1
	Soleil d'or	1	....	....	1	....	....	July 9	Aug. 1
Polyantha	Aennchen Mulier	1	....	....	1	....	....	June 31	Sep. 20
	Crimson Rambler	2	....	....	2	....	....	....	....
	Dorothy Perkins	2	....	1	1	....	....	July 26	Oct. 1
	Katherine Zeimet	1	....	....	1	....	....	July 6	Sep. 22
	Madame Taft	1	....	....	....	....	....	Run to	briar.
	Mrs. W. Catbush	1	....	....	1	....	....	....	....
Rugosa	Common	26	....	....	26	....	....	June 26	Aug. 20
	Belle Poitevine	1	....	....	1	....	....	June 30	July 20
	Blanc Double de Coubert	1	....	....	1	....	....	July 4	July 24
	Calocarpa	1	....	....	1	....	....	July 1	Aug. 1
	Conrad F. Meyer	1	....	....	1	....	....	July 23	Aug. 2
	Mme. Geo. Bruant	1	....	....	1	....	....	July 1	Aug. 20
	Mrs. Anthony Waterer	1	....	....	1	....	....	July 7	Aug. 10
	Rose à parfum de l'Hay	1	....	....	1	....	....	July 9	Aug. 10
	Roseraie de l'Hay	1	....	....	1	....	....	July 1	Aug. 1

FLOWERS.

VARIETY TESTS.

Over six hundred varieties of perennials, annuals, and bulbs were sown or planted in 1913. There was bloom from the middle of April, when the crocuses came out, until the hard frosts of November, when sweet peas were still exhibiting their fine colours.

The following list gives details about annuals:—

No. of varieties.	Name.		Sown.		Transplanted	Planted	In Bloom.	
	Botanical.	Common.	Under Glass.	Outside.			From	To
3	*Acroclinium*	Everlasting flower	Apr. 4		May 7	June 21.	July 4	Sept. 15
2	*Alonsoa*	Mask flower	Mar. 25.		" 6.	" 20	Aug. 1.	" 14
1	*Alyssum maritimum compactum*	Sweet alyssum		May 21			July 14.	" 30
1	*Ammobium alatum*	Winged everlasting	Apr. 11.		May 7	June 21.	" 5.	" 30
17	*Antirrhinum*	Snapdragon	Mar. 24.		" 7	" 7.	" 12	" 15
2	*Balsamina impatiens*	Balsam	" 28.		Apr. 14.	" 12.	" 4	" 14
1	*Brachycome iberidifolia*	Swan River daisy		May 21			" 20	" 30
1	*Celosia*	Cockscomb	Mar. 20.		May 5.	June 12.	" 21.	" 30
3	*Centaurea moschata*	Sweet sultan		May 21			Aug. 7.	" 30
1	*Chrysanthemum indicum*	Japanese chrysanthemum	Mar. 25.		May 21	June 25.	Did not bloom.	
1	*Clarkia elegans*	Clarkia	" 25.	May 5.			July 21	Sept. 14
8	*Coreopsis*	Tickseed	Apr. 11.		May 21	June 25	" 1	" 14
44	*Callistephus hortensis*	China Aster	Mar. 28.		" 6	" 9	" 12	" 23
1	*Cosmos*	Cosmos	May 21.			" 25	Aug. 11	" 30
3	*Delphinium consolida candelabra*	Stock-flowed larkspur			May 5.		" 10	" 30
2	*Dianthus chinensis*	China pink	Mar. 29.		" 21	June 4.	July 21.	" 30
1	" *superbus*	French pink	" 29.		" 21.	" 4.	" 21.	" 30
1	*Dimorphotheca aurantiaca*	Cape marigold		May 21			" 24	" 30
1	*Eschscholtzia californica*	California poppy		" 5.			" 4	" 2
2	*Gaillardia*	Blanket flower	Mar. 25		May 21.	June 25.	Aug. 1.	" 23
2	*Godetia compacta*	Godetia		May 5			" 1.	" 23
1	*Gomphrena*	Bachelor's button	Mar. 25.		Did not	germinate.		
1	" *globosa*	Globe amaranth	" 25.		"	"		
1	*Helichrysum*	Everlasting flower	Apr. 19.		May 20	June 25.	Aug. 15.	Sept. 30
2	*Iberis umbellata*	Candytuft		May 5.			July 9.	" 30
73	*Lathyrus odoratus*	Sweet peas		" 5			" 9	
2	*Linaria Maroccana*	Toad flax		May 21.			" 14	Sept. 30
3	*Lobelia Erinus*	Lobelia	Mar. 20.		May 5.	June 9.	June 23.	" 30
1	*Lupinus*	Lupine		May 5.			July 12	" 30
2	*Malope grandiflora*	Malope		" 5.			Aug. 15.	" 30
12	*Mathiola annua grandiflora*	Ten-week stock	Mar. 29.	" 5.	May 15.	June 24.	July 14	" 30
1	*Mirabilis Jalapa*	Marvel of Peru	Apr 11.		" 5.	" 25	July 4	" 30
5	*Nemesia grandiflora*	Nemesia	Mar. 25.		" 21.	" 25	" 1	" 14
1	*Nigella*	Love-in-a-mist		May 5			Aug. 20	" 14
1	*Papaver glaucum*	Tulip poppy		" 5			July 21	" 2
1	" *Rhoeas*	Shirly poppy		" 5			" 21	" 2
2	" *somniferum*	Opium poppy		" 5			" 27	" 2
4	*Petunia hybrida*	Petunia	Mar. 20		May 5	June 7.	June 18.	" 15
7	*Phlox Drummondii*	Phlox	" 25.		" 7.	" 7.	" 26.	" 15
1	*Portulaca grandiflora*	Portulaca	" 20.		" 5	" 7.	" 23.	" 14
1	*Reseda odorata*	Mignonette		May 21.			July 14.	" 30
1	*Rhodanthe maculata*	Rhodanthe		" 5	Did not	germinate.		
6	*Salpiglossis variabilis grandiflora*	Painted tube tongue	M. r. 28.		Apr. 27.	June 16.	July 14.	Sept. 15
1	*Salvia*	Sage	" 26.		May 5	" 20.	Aug. 1.	" 15
7	*Scabiosa atropurpurea grandiflora*	Pincushion flower	Apr. 5		" 20	July 3.	" 10	" 15
1	*Tagetes erecta*	African marigold	" 8.		" 21	June 12	July 14.	" 14
1	" *patula*	French marigold	" 8		" 25	" 12.	" 4.	" 14
5	*Tropaeolum majus*	Climbing nasturtium	" 22.			" 16.	" 14.	" 15
7	" *minus*	Dwarf nasturtium	" 22			" 16.	" 7.	" 14
7	*Verbena*	Verbena	Mar. 20.		May 13.	" 4	" 12	" 30
4	*Viola tricolor*	Pansy	" 29		" 5	" 4	June 26.	
7	*Zinnia elegans*	Youth-and-Old-Age	Apr. 8.		" 15	" 25	July 12.	Sept. 30

QUEBEC EXHIBITION.

A show of flowers was made at Quebec exhibition, and it is gratifying to report that a diploma was awarded to it, besides one of the gold medals given by the management for best display made in the Palace of Industry. This medal was won in competition with large firms who spend thousands of dollars for advertising, and who neglected nothing to win at Quebec. It can truthfully be said that our display of flowers attracted more people than any other one at the fair, as there was continually a large crowd around it. Special inscriptions asked farmers to make the home surroundings more attractive and thus reward the faithful wife for her tireless work in bringing up the family, and at the same time keep the boys and girls on the place if at all possible.

SEED DISTRIBUTION.

Over 1,400 packages of seed of annuals and perennials were saved and distributed, and quite a number of plants of the latter put in last summer for distribution in the spring of 1914. At the Quebec Exhibition, a card made it known that the two hundred first farmers who applied would be entitled to the free distribution, and it did not take long before the applications were received for all we had to give away. This shows the interest taken in trying to beautify the home grounds.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C .McKILLICAN, B.S.A.

The season of 1913 has been nearly a normal Manitoba season. The principal departure from average conditions was in the rainfall, which was rather light in the early part of the season.

Garden crops were planted in good time, with the soil in good condition. Germination was satisfactory in most instances and, as the land was kept well cultivated, the dry weather did not affect growth to any great degree. The dry weather had a more noticeable effect on annual flowers than anything else, and the bloom was hardly as good as usual until the latter part of the summer.

POTATOES.

Twenty-eight varieties of potatoes were planted in the uniform test rows on May 24, and dug on September 16. In order to eliminate as much as possible any chance of experimental error, the duplicate system of testing was followed. The following yields are therefore calculated from the average product of two 66-foot rows.

Variety.	Form.	Colour.	Size.	Yield per Acre. Bush.	Lb
Empire State	Long	White	Large	682	00
Table Talk	"	"	"	650	50
Wee Macgregor	Oval	"	"	605	50
Rawlings Kidney (Ashleaf Kidney)	Long	"	"	599	30
American Wonder	"	"	"	590	20
Peacock's Surprise	"	Russet	Medium	586	40
Reeves' Rose	"	Pink	Large	583	00
Woodbury's White Rose	"	White	"	577	30
Sabean Elephant	Oval	"	"	566	30
Manitoba Wonder	Long	Red	Medium	562	50
Late Puritan	"	White	Large	509	40
Early Norther	"	Pink	"	508	40
Hamilton's Early	Round	White	"	507	50
Morgan Seedling	Long	Light pink	"	506	00
Irish Cobbler	Round	White	"	496	50
Houlton Rose	Long	Pink	"	485	50
Carman No. 1	Oval	White	Medium	484	00
New Queen	"	Pink	"	480	20
Early Ohio	Round	Red	Large	480	20
Rochester Rose	Oval	Light pink	Medium	478	30
Early Hebron	"	Pink	"	474	50
Early Bovee	Medium Long	Light pink and white	"	454	40
Gold Coin	Oval	White	"	454	40
Early White Prize	Long	"	"	445	30
Money Maker	"	"	Small	440	00
May Flower	Round	"	"	372	10
Factor	Long Flat	"	Medium	344	40
Hard to Beat	"	"	Small	293	20

COMMERCIAL FERTILIZERS ON POTATOES.

Three kinds of commercial fertilizers were tested separately on potatoes, and a combination of the three was also used. Acid phosphate was used, representative of fertilizers containing phosphorus. Muriate of potash was chosen as a typical potash

manure, and sulphate of ammonia was used for nitrogen. The duplicate system of testing was used for this experiment, and the following yields are based on the average product from two 66-foot rows. The potatoes were planted May 31 and dug on September 26.

Fertilizers used.	Yield per Acre.	
	Bush.	Lb.
No fertilizers	429	00
Muriate of potash (320 pounds per acre)	474	50
Acid phosphate (600 pounds per acre)	480	20
Sulphate of ammonia (160 pounds per acre)	491	20
Acid phosphate (600 pounds per acre) Muriate of potash (320 pounds per acre) Sulphate of Ammonia (160 pounds per acre)	476	40

Each of these fertilizers cost about $9 to $10 per acre in the quantities used, exclusive of cost of application.

FIVE-YEAR, AVERAGES.

Thirteen varieties of potatoes have been grown on this Farm for five years, six others for four years, and three others for three years. The following table gives the average results of the tests for these kinds:—

Variety.	Average Earliness.	Average Size.	Average Yield.	
			Bush.	Lb.
Rawlings Kidney (Ashleaf Kidney)	Late	Large	534	30
Empire State	Medium	"	523	12
American Wonder	Late	"	480	46
Morgan Seedling	Medium	"	479	30
Reeves' Rose	"	Medium	467	26
Late Puritan	Late	Large	465	10
Irish Cobbler	" early	Medium	448	34
Money Maker	" late	"	446	36
Early White Prize	Early	Small	443	42
Manitoba Wonder	Medium	Medium	443	42
Carman No. 1	"	Large	418	26
Rochester Rose	Early	Small	400	24
Gold Coin	Late	Large	378	24

AVERAGE FOR FOUR YEARS.

Woodbury's White Rose	Medium	Medium	530	10
Early Ohio	Early	Large	482	10
Peacock's Surprise	Medium	Medium	464	45
Hamilton's Early	" early	"	441	22
Factor	Late	Small	301	45
Hard to Beat	"	"	248	55

AVERAGE FOR THREE YEARS.

Table Talk	Late	Large	714	24
Early Bovee	Early	Medium	509	40
Sabean's Elephant	Late	Large	459	30

POTATOES—EARLINESS TEST.

Twelve of the early maturing varieties of potatoes were tested for earliness. They were all planted on May 3. The following table gives the time they were fit for table use:—

Variety.	Fit for Use.
Early White Prize	July 3.
Early Bovee	" 5.
New Queen	" 14.
Rochester Rose	" 14.
Hamilton's Early	" 14.
Early Norther	" 14.
Houlton Rose	" 14.
Early Hebron	" 14.
Early Ohio	" 14.
Reeves' Rose	" 14.
Manitoba Wonder	" 14.
Irish Cobbler	" 21.

SMALL VS. LARGE POTATOES FOR SEED.

A test in comparing large and small potatoes for seed was made. The same variety, Table Talk, was used for both, and duplicate tests were made. The potatoes were planted May 24. and dug September 16. The results are calculated from the product of two 66-foot rows.

Kind of Seed.		Yield per Acre.	
		Bush.	Lb
Large potatoes	(Cut to sets)	650	50
Small potatoes	(Planted whole)	497	00

The resultant crop contained a larger percentage of small potatoes where the small potatoes were used for seed.

COOKING TEST OF POTATOES.

A cooking test of twenty-eight varieties of potatoes was made. The following table gives the results of this test:—

Variety.	Character of Surface.	Flavour.	Texture.	Dryness.	Remarks.
Empire State	Medium shallow eyes	Very good	Fine	Fairly dry	Affected slightly by dry rot.
Table Talk	Very shallow eyes	Good	Rather coarse	"	
Wee Macgregor	" " "	Very good	Fine	"	
Rawlings Kidney (Ashleaf Kidney)	Medium shallow eyes	"	"	Dry	Skin rather rough.
American Wonder	Shallow eyes	Good	Medium fine	Fairly dry	
Peacock's Surprise	Very shallow eyes	Very good	Fine	Fairly dry	
Reeves' Rose	Deep eyes	"	"	Dry	
Woodbury's White Rose	Smooth, shallow eyes	Medium (slightly strong)	Fine	Medium	
Sabean's Elephant	Medium deep eyes	Very good	Medium	Dry	
Manitoba Wonder	Medium shallow eyes	Medium	"	Fairly dry	Some red flesh.
Late Puritan	Many eyes and fairly deep	"	Fine	Medium	
Early Norther		Good	Medium	"	
Hamilton's Early	Smooth, shallow eyes	"	Fine	Fairly dry	
Morgan Seedling	Smooth but deep eyes	Medium	Medium	Dry	
Irish Cobbler	Very deep eyes	Very good	Fine	Fairly dry	
Houlton Rose	" "	Medium	"	Moist	Some red flesh.
Carman No. I	Deep eyes	" (rather strong)	Medium	Dry	Slow to cook.
New Queen	Rather deep eyes	Good	"	Medium	
Early Ohio	Deep eyes	Medium	Fine	Moist	
Rochester Rose	Very deep eyes	"	Medium	Fairly dry	
Early Hebron	" "	Very good	Fine	Dry	
Early Bovee	Deep eyes	Medium	Coarse	Moist	
Gold Coin	Very shallow eyes	Very good	Very fine	Dry	
Early White Prize	Medium shallow eyes	Good	Medium	Medium	Cooks quickly.
Money Maker	Very shallow eyes	Very good	Fine	Fairly dry	
May Flower	Smooth, rather deep eyes	Good	"	Moist	
Factor	Very shallow eyes	"	Very fine	Dry	Falls apart on cooking.
Hard to Beat	Very shallow eyes	"	Fair	Moist	

VEGETABLES.

CABBAGE.

Twenty varieties of cabbage were sown in the hotbed in April, and set out in the garden the last week in May. One variety, Copenhagen Market, was grown from two different strains.

Some injuries were noted from the larvæ of the small White Cabbage Butterfly (*Pontia rapae*). The use of pyrethrum insect powder will overcome this difficulty.

Variety.	Ready for use.	Weight of 10 heads.	Weight of individual large head.
		Lb.	Lb.
Copenhagen Market (B.)	July 21	168	19
Kildonan	Aug. 25	152	20
Northern Favorite	Aug. 25	142	19
Improved Amager Danish Ballhead	Aug. 25	129	16
Copenhagen Market (H.)	July 21	122	23
Extra Amager Danish Ballhead	Aug. 25	119	14
Glory of Enkhuizen	Aug. 28	116	14
Fottler's Improved Brunswick or Short Stem	Aug. 23	111	15
Large Late Flat Drumhead	Aug. 25	110	15
Flat Swedish	Aug. 25	100	15
Magdeburg	Aug. 15	85	14
Lubeck	Aug. 18	75	11
Early Jersey Wakefield	July 18	74	8½
Danish Summer Ballhead	Aug. 25	67	12
Winningstadt	Aug. 9	64	9
Early Paris Market	July 22	62	7
Small Erfurt	Aug. 18	51	6½
Midsummer Savoy	July 22	36	4

RED OR PICKLING CABBAGE.

Variety.	Ready for use.	Weight of 10 heads.	Weight of individual large head.
		Lb.	Lb.
Danish Delicatesse	Sept. 30	70	14
Red Danish Stonehead	" 30	52	7

CAULIFLOWER.

The varieties of cauliflower were sown in the hotbed April 14, and planted out the first week in June.

Variety.	Percentage of Good heads.	Texture.	Flavour.	Fit for use.	Average weight.
					Lb.
Danish Giant or Dry Weather	76	Very tender	Good		11
Extra Selected Early Dwarf Erfurt	76	"	"	July 26	10
Early Snowball	92	"	" very	July 21	8½

BRANDON.

CARROTS.

Three varieties were sown on May 1, in uniform test rows and dug September 20.

Variety.	Yield per acre.		Remarks.
	Bush.	Lb.	
Half Long Chantenay	919	36	Very large.
Improved Nantes	851	48	Medium size.
French Horn	512	20	Nearly one half badly cracked.

CELERY.

Seven varieties of celery were sown in the hotbeds April 11, and planted out in the gardens the first week in June. The plants were dug up October 10, and the yield as given in the following table is the product of a 15-foot row of each variety.

Variety.	Colour.	Texture.	Flavour.	Length of head.	Yield from 15-foot row.
				Inches.	Lb.
Evans' Triumph	White	Fairly good	Good	26	34
French Success	"	Coarse, large, hard core	Rather strong	23	32½
Giant Pascal	"	Very tender and crisp.	Good	18	24
Noll's Magnificent	"	Rather hard and coarse	Mediumstrong	24	24
Paris Golden Yellow	Yellow	Medium	Rather strong	19	18
Rose Ribbed Paris	White	Medium coarse	Medium	14	15
White Plume	"	Very tender and crisp.	Very good	13	16

The White Plume is recommended for home use, despite its small yield. It is superior in flavour and in tenderness and crispness.

CUCUMBERS.

Five varieties of cucumbers were sown on June 15, in hills 6 feet apart and four plants to a hill. The yields given in the following table are the product of 12 plants in each case:

Variety.	Fit for use.	Shape.	Yield from 12 plants.
			Lb.
Prize Pickling	July 30	Long	135
Peerless White Spine	Aug. 11	Medium	109
Giant Pera	" 9	"	104½
Extra Early Russian	" 2	Short	93½
Cool and Crisp	" 11	Medium	87

RADISHES.

Two varieties of radish were sown on May 14.

Variety.	Fit for use	Texture.	Flavour.
Early Scarlet White Tipped	June 12	Crisp	Very strong.
Forcing Turnip Scarlet	" 14	Medium tender	Medium strong.

BEETS.

Six varieties were sown in uniform test rows on May 19, and were harvested on September 10. The following yields are calculated from the product of 30-foot rows, 30 inches between the rows:

Variety.	Shape.	Texture.	Flavour.	Yield per acre.		Outward Appearance.
				Bush.	Lb.	
Early Blood Red Turnip	Oval	Coarse	Medium	1,229	20	Large, rough.
Eclipse	Varied	Coarse	Fairly good	1,122	52	Not uniform.
Ruby Dulcet	Flat	Rather coarse	Good	919	36	Large, rather rough.
Meteor	Round	Very fine	"	900	12	Uniform smooth.
Egyptian Dark Red Turnip	Flat	Coarse	Fairly good	871	12	Rather rough.
Black Red Ball	Round	Very fine	Very good	561	26	Small, excellent quality

BEANS.

Seven varieties of beans were sown on May 19. The following results were obtained:

Variety.	Colour.	Texture.	Flavour.	Ready for use.	Length of Pod.
					Inches.
Bountiful	Green	Very tender	Excellent	July 26	6
Early Refugee	"	"	Very good	Aug. 14	5
Honey Pod	Yellow	Tough	Good	Aug. 2	5
Keeney's Rustless Wax	"	Tender	"	Aug. 6	5
Stringless Green Pod	Poor germination.				
Valentine	Green	Stringy	Medium	July 31	5
Wardwell's Kidney Wax	Yellow	Tender	Good	Aug. 6	5

CORN.

Seven varieties of garden corn were sown on May 26 in hills 3 feet apart each way. Part of each row was used for the cooking test, and twelve hills were reserved for the test of yield.

Variety.	Ready for Use.	Texture.	Flavour.	Height of Stalks.		No. of Cobs.	Weight of Cobs.
				Feet.	In.		Lb.
Carter's Improved Sweet	Sept. 12	Very good	Very good	4		60	20
Early Malcolm	Aug. 18	"	"	4		70	15
Early Iowa	Sept. 9	Excellent	"	3	6	87	24
Fordhook Early	" 2	Good	Medium	3	6	75	24
Golden Bantam	" 4	Excellent	Excellent	4	6	84	19
Henderson's Metropolitan	" 9	Good	Medium	5	10	56	25
Perkin's Early	" 10	Very good	Very good	5	6	56	18

The strain of Golden Bantam was not as good this season as in previous years, the cobs, being short. The eating quality of this variety was up to its usual standard, *i, e.*, much ahead of anything else.

Early Malcolm is a selection of Early Malakoff, made at the Central Experimental Farm. It is recommended for early use.

Seed purchased for Squaw corn and Early Adams proved to be some large late variety instead of what it purported to be.

LETTUCE.

Thirteen varieties of lettuce were sown in the garden on April 21. Some slight trouble was experienced with cutworms, but this difficulty was overcome, and a good test was secured.

Variety.	Ready for use.	Texture.	Flavor.	End of season.	Average weight of head.	
					lb.	oz.
All Heart	July 1	Crisp and very tender	Very good	July 18	1	12
Black Seeded Simpson	" 8	Medium tender	Good	" 16	0	10
Crisp as Ice	June 28	Crisp, tender	Very good	" 20	0	14
Dark Green Capucine	July 4	Crisp, fairly tender	Good	" 18	1	2
Denver Market	" 10	Crisp, medium, tender	"	" 26	2	0
Grand Rapids	" 10	Medium crisp and tender	"	" 22	0	11
Giant Crystal Head	" 3	Very crisp and tender	Very good	" 22	2	4
Iceberg	" 9	Crisp, very tender	" "	" 27	1	15
Improved Hanson	" 9	Medium crisp and tender	" (slightly bitter)	" 21	1	0
Red Edged Victoria	June 20	Medium	Medium	June 30	0	8
Rousseau Blond Winter	" 24	Tough	Poor	July 5	0	14
The Favourite	" 26	Crisp and tender	Good	" 26	1	10
Unrivalled Summer	" 27	Tender	Medium	" 13	0	14

Red Edge Victoria runs to seed very early. Iceberg, All Heart, Crisp as Ice, and Giant Crystal Head are recommended both for quality and length of season.

ONIONS.

Twelve varieties of onions were sown in uniform test rows on April 18. The yields given are calculated from the product of 30-foot rows, being 15 inches apart.

Variety.	Colour.	Shape.	Yield per acre.	
			Bush.	Lb.
Large Red Wethersfield	Red	Flat	1,023	22
Salzer's Wethersfield	"	"	813	6
Johnson's Dark Red Beauty	"	"	619	30
Extra Early Red	"	Round	609	49
Ailsa Craig	White	Globular	609	49
Danvers Yellow Globe	Yellow	Oval	600	9
McKenzie's Northland	Red	Round	594	8
Red Early Flat	"	Flat	503	21
New Australian Brown	Brown	Round	435	35
Early Barletta (Pickling onion)	White	Flat	212	57
White Pearl " "	"	"	193	36
White Queen " "	"	"	87	7

PARSNIPS.

Three varieties of parsnips were sown on April 19, and dug October 10.

Variety.	Shape.	Yield per acre.		Texture.	Flavour.
		Bush.	Lb.		
Hollow Crown	Very long	648	32	Good	Very good.
New Intermediate	Short	590	28	Good	Very good.
Elcombe's Improved	Long	580	48	Good	Very good, mild

The form of the New Intermediate parsnip makes it much to be preferred over the old long type. It is a medium short root, and is quite easily dug.

PARSLEY.

One variety of parsley, the Double Curled, was grown. It was sown May 14, and was fit for use July 18. The quality was fair and the yield good.

SPINACH

One variety, Improved Thick Leaved, was sown May 14, and it produced a very fair crop.

SALSIFY.

One variety, Long White, was sown May 14, and was ready for use August 20. The total yield from a 30-foot row was 66 pounds.

PEAS.

Fifteen varieties of peas were sown on April 23; with one exception, all germinated uniformly. The yields given below are the product of 30-foot rows. The peas were harvested when ripe.

Variety	Ready for use.	Length of Vine	Length of Pod	Average Number of Peas in Pod.	Texture.	Flavour.	Yield.
		Inches.	Inches.				Lb. oz.
American Wonder	June 21	18	2½	5	Very good	Very good	3 8
Early Pilot	" 28	—	—	—	"	"	5 0
Gregory's Surprise	" 24	18	3	5	"	"	2 8
Gradus	July 1	56	4½	8	"	Good	3 8
Heroine	" 8	48	5	8	Good	Medium	5 4
Juno	" 8	30	4	8	"	"	5 8
McLean's Advancer	June 30	24	3	5	Very good	Good, very sweet	4 8
Nott's New Perfection	July 2	16	3½	6	"	Very good	3 0
Premium Gem	June 26	16	3	6	"	"	3 8
Quite Content	Aug. 8	60	5	9	Good	Medium	5 6
Rent Payer	July 12	30	4½	9	Not tested	Not tested	3 4
Rivenhall Wonder	" 14	32	4	9	Good	Good	4 0
Reliance	" 3	36	4	8	Very good	Very good	5 0
Stratagem	" 10	42	5	9	"	Excellent	4 8
Sutton's Excelsior				No germination			
Telephone	July 10	60	5	7	Very good	Very good	3 12
Thos. Laxton	June 27	24	4	6	Good	"	3 4
Western Beauty	" 26	36	3½	6	Not tested	Not tested	4 4

Gregory's Surprise and American Wonder are recommended for earlier use. Stratagem and Reliance are two of the best later sorts, but many of them are very good.

SQUASH AND MARROW.

Eight varieties of squash and marrows were sown on June 5. The yields given in the following table are the product of 12 plants of each variety.

Variety.	Shape.	Vine.	Colour of Rind.	Yield.	Weight of one Specimen.
				Lb.	Lb.
Long Vegetable Marrow	Long	Long	White	304	20¾
Carter's Trailing Vegetable Marrow	"	"	"	297	35½
Long White Bush Marrow	"	Bush	"	231	13½
Golden Hubbard	Oval	Long	Orange	223	10
Delicious	"	"	Green	206	14½
Delicata	Cylindrical	"	Striped	102½	5
Summer Crookneck	Crooked	Bush	Orange	63	5½
Custard Marrow White Squash Scalloped	Round and flat	Bush	White	40	5

TOMATOES.

Twelve varieties of tomatoes were tested this year. They were started in a hotbed on April 11, and were set out in the garden the first week in June. The success attained in ripening tomatoes this year is due to the method adopted in growing them. They were pruned more severely than ever before, whole leaves and branches being taken off, as well as the flowering shoots. The plants were fastened up to stakes, so that the sun shone on the fruit. Ripe fruit was produced abundantly by the middle of August. The following yields were obtained from five average plants from each variety:

Variety.	No. of Plants.	Ripe Fruit.		Green Fruit.		Total.	
		Lb.	Oz.	Lb.	Oz.	Lb.	Oz.
Sparks' Earliana, Sunnybrook Strain	5	24	09	3	8	28	01
North Adirondack Earliana	5	24	06	3	7	27	13
Chalk's Early Jewel	5	15	07	8	3	23	10
Prosperity	5	21	13	1	7	23	04
I X L	5	15	10	5	7	21	01
Florida Special	5	12	07	8	5	20	17
Alacrity 2-24-9	5	15	13	2	4	18	01
Alacrity 2-24-10	5	15	11	2	0	17	11
Rennie's Earliest	5	13	09	3	0	16	09
Bonny Best	5	11	02	4	8	15	10

TURNIPS.

Two varieties of early turnips were sown on May 14 and were ready for use on August 1.

Variety.	Shape.	Colour.	Texture.	Flavour.	Yield per acre. Bush.	Lb.
Extra Early White Milan	Flat	White	Hard to cook, very tough	Bitter	797	5
Long White Flat Strap Leafed	Flat	White	Hard to cook, tough.	Very bitter.	706	37

FRUIT TREES.

The season of 1913 has, on the whole, been a favourable one for fruit trees. No serious injury from weather conditions was noted in the spring. However, a number of trees died from the effects of sunscalding in 1912. A number of trees were affected by fire blight. No important damage from insects was noted.

APPLES.

Not much success can be reported with standard apples. A couple of trees of a variety called Sweet Russet bore fruit, but the quality of the fruit was not very good.

A large number of trees of Dr. Saunders' cross-bred varieties are doing well. These varieties were produced by crossing standard apples with *Pyrus baccata*, a wild Siberian type of crab apple, as the mother. This is very hardy, but bears small, astringent fruit. These cross-bred apples are about the size of a crab apple, and, while they are not of sufficiently good flavour to be eaten raw with much pleasure, they make very good preserves or jelly. Some of the most successful varieties this year are Silvia, Alberta, Elsa, Columbia, Ruby, Northern Queen, Eve, and Carleton.

There are quite a number of seedlings of cross-bred apples growing in the orchard. Most of these produce fruit abundantly, but the fruit is very inferior. A few trees have borne fruit of good quality, two in particular, a seedling of Cluster and a seedling of Sparta being deserving of mention.

The young seedling trees of standard varieties planted in 1912 have done well. Additional seeds and seedlings of the Charlamoff, Blushed Calville, Repka Kislaga, Hibernal, Patten's Duchess, and August have been planted this year. As was done last year, these are planted in large numbers in nursery rows, 1 foot apart in the row, and the rows 3 feet apart. Thus a large number can be grown on a small area. The object is to test the hardiness of the individual plants before they are set out in permanent locations. Large numbers are used so that a greater selection is possible. By starting with the seeds or with yearling trees, a longer period is possible for selection and acclimatization than is possible with the usual size of trees obtained from nurserymen.

PLUMS.

The plum orchard bore very prolifically this season and, with one or two exceptions, the fruit ripened before the frost became severe. A number of young trees of the Cheney variety which were set out only last season bore small quantities of fruit. The

Major plum, a selection of the native stock, again ripened nearly two weeks earlier than the other kinds. This plum, though rather small and thick in the skin, is of excellent flavour, and makes splendid preserves. The usual variety of native plum was also harvested, as were some promising seedlings of Cheney.

The Compass Cherries appear to be quite hardy, and bear freely. The fruit has the distinct flavour of cherries. Of the other hybrid plums, Opata, Sapa, etc., which were put out last season, none fruited as yet, but for the most part they made a good growth.

SMALL FRUITS.

The new plantation of small fruits has grown very well this season, but on account of the small quantities of fruit produced, no definite record was kept as to yield except in a few instances. A single bush of Houghton gooseberries gave nearly 5 pounds of fruit and nearly all the bushes of that variety bore some fruit, while Downing bore no fruit whatever. The Caroline, Herbert, and Sunbeam raspberries all produced small quantities of berries.

ROSES.

There are about twenty-four varieties of roses in the rose bed. These were all cut back in the autumn of 1912 and banked up with earth and straw so as to prevent frost injuries. The result was that very little killing back was noticeable, and a number of the bushes flowered quite freely this season. The following are amongst the best bloomers:—

Name.	Commenced to bloom.
Hybrid Perpetuals—	
Magna Charta	June 28
Mrs. R. G. Sharman-Crawford	June 21
Mrs. John Laing	June 28
Earl of Dufferin	June 28
Ulrich Brunner	June 21
Margaret Dickson	July 5
Rugosa Hybrids—	
Blanc Double de Coubert	June 18
Madame Georges Bruant	July 28
Conrad F. Meyer	Sept. 1
Austrian Briar—	
Persian Yellow	June 20 to 28

FLOWERS.

Notwithstanding the fact that the perennial flowers produce an abundance of bloom with a minimum amount of labour, there is a dearth of them in the western farm gardens. Realizing this, a perennial border has been commenced on the Farm this year, in order to demonstrate the ease with which hardy varieties can be maintained, and also to illustrate the arrangement of the plants. The bed has not been completed this year, but the plantings have been so arranged that additions can be made from time to time.

BRANDON.

In the old perennial beds a succession of bloom was maintained from the bloom of the iris in May, until the frosts of October destroyed the giant daisies, perennial phlox, etc. The following lists of hardy perennials is here appended with time of full blooming:—

Variety.	Date of Full Bloom.
Siberian Iris (*Iris sibirica*)	June 14
German Iris (*Iris germanica*)	June 16
Columbine (*Aquilegia*)	June 16
Day Lily (*Hemerocallis*)	June 16
Pinks (*Dianthus*)	June 18
Bleeding Heart (*Diccntra spectabilis*)	June 18
Paeony (*Paeonia*)	June 22
Sweet William (*Dianthus barbatus*)	June 30
Horse Mint (*Monarda punctata*)	July 12
Perennial Larkspur (*Delphinium*)	July 17
Campion (*Lychnis chalcedonica*)	July 20
Perennial Phlox (*Phlox paniculata*)	Aug. 1
Bellflower (*Campanula Raineri*)	Aug. 15
Giant Daisy (*Chrysanthemum uliginosum*)	Sept. 15

FLOWERING BULBS.

The usual supply of flowering bulbs was received in the autumn of 1912. The daffodils, scillas, etc., and a few of the tulips were potted and kept in the basement for use in the house during the winter. The following is a list of a number of these varieties, and time of blooming:—

	Brought up from basement.	Bloomed.
Narcissi or Daffodils—		
Golden Spur		Feb. 9.
Barri Conspicuus	Jan. 15.	Feb. 14.
Sir Watkin	Feb. 4.	Feb. 18.
Cynosure	" 6.	" 23.
Princeps	Mar. 7.	Mar. 17.
Empress	" 7.	" 22.
Poeticus Ornatus	Apr. 2.	Apr. 14.
Scilla.—		
Scilla sibirica	Mar. 4.	Mar. 10.
Chionodoxa—		
Luciliae	Feb. 18.	Feb. 23.
Gigantea	" 24.	Mar. 8.

TULIPS.

Variety	Colour	Brought up from Basement	Bloom.
Keizerskroon	Red and yellow	Jan. 15	Feb. 3.
Pottebakker (Scarlet)	Bright red	" 29	" 15
Duchesse de Parma	Brick red	" 29	" 17.
Joost von Vondel	White	Feb. 6	" 20.
Cottage Maid	Rose and white.	" 11.	" 26.
Couronne d'Or	Orange yellow	" 15	Mar. 4.

The tulips that were planted in the flower beds made an exceptionally fine showing. The varieties were arranged so that the colour blended, and only those that bloomed about the same time were placed together. The usual method of planting in the fall and mulching, was followed.

EARLY OR DUTCH TULIPS.

Variety.	Colour.	Blooming Period.	
		From.	To.
Artus	Bright red	May 15	May 29.
Cottage Maid	Rose and white.	" 24	" 30.
Couronne d'Or	Orange yellow	" 15	" 27.
Chrysolora	Orange yellow	" 12	" 29.
Duchesse de Parma	Brick red	" 15	" 29.
Imperator Rubrorum	Scarlet	" 23	" 30.
Joost von Vondel (white)	White.	" 13	" 27.
" (Red)	Red	" 23	" 30.
Keizerskroon	Red and yellow	" 23	" 29.
La Reine	White.	" 15	" 27.
Murillo	Pinkish white	" 23	" 31.
Pottebakker (white)	White	" 12	" 27.
Pottebakker (Scarlet)	Scarlet	" 23	" 30.
Vermilion Brilliant	Scarlet	" 15	" 28.

DARWIN AND COTTAGE OR LATE TULIPS.

Variety.	Colour.	Full Bloom.
Darwin	Varied	June 2.
Gesneriana Spathulata		May 31.
Isabella		May 29.
La Merveille	Bronzy salmon	" 29.
La Candeur	White	" 29.
Picotee	White, pink edge	" 29.
Yellow Rose	Golden yellow	" 31.

DAHLIAS.

About thirty varieties of dahlia were received from Ottawa this season. All were planted, but owing to a dry period ensuing immediately after planting, the growth was not as strong as usual. The flowers were much smaller than in 1912. The following are a few of the best bloomers, with time of flowering.

Variety.	Time of Flowering.
M. D. Hallock	July 28.
Gabriel	Aug. 6.
Sylvia	Aug. 7.
Capstan	Aug. 25.

Later in the season the Cactus Queen, Bon Ton, and King Fisher.

ANNUALS.

The season for flowers has, on the whole, been fairly satisfactory, though somewhat dry in the early part. The method of sowing the seed in boxes in the hotbed early in April, and transplanting in June to the flower beds, has again been successfully followed. The sweet peas, nasturtiums, etc., were sown in the outdoor beds. Thirty-two varieties of asters were grown. These made a splendid showing. The blight which usually attacks the asters here was largely combatted by moving them to a different part of the grounds. Only a very small percentage of loss was noted in the new location, while a few varieties planted on the usual beds were badly injured.

SWEET PEAS.

About 100 varieties of sweet peas were under test this season. With the exception of about one dozen varieties, which failed to germinate, they did very well, giving a wealth of bloom, even late in the season.

The soil for the sweet peas was dug up deeply the previous fall. All seed was sown on April 22, and the plants were in bloom by the second week in July. The following are selected for size of flowers, and distinctness of colouring:—

Variety.	Colour.
King Edward VII	Rich crimson.
Black Knight	Maroon.
Lord Nelson	Deep navy blue.
Paradise Ivory	White.
Countess Spencer	Pink.
Stirling Stent	Salmon orange
Helen Pierce	Marbled or marbled blue.
Senator Spencer	Claret flaked on heliotrope ground.
Aurora	Blushed pink

ANNUALS.

Notes were taken on the flowers as in all the experimental work, and the following list of varieties with a part of the data secured, is here appended:—

Variety.	Where sown.	Date sown.	Date Transplanted.	Height of Plant.	Flowering Period.
Aster (33 varieties)	Hotbed	April 12	June 5	13 in. to 2 ft. 4 in.	July 22 to Oct. 7.
Antirrhinum (13 varieties)	"	" 11	" 5	9 in. to 2 ft. 8 in.	" 16 until frost Sept. 22).
Alonsoa (2 varieties)	"	" 12	" 4	2 ft. 5 in.	Mny 5 to Sept. 10.
Balsam (mixed)	"	" 12	" 4		Froze off June 5.
Brachycome iberidifolia	"	" 12	" 4	14 in.	June 28 to Sept. 13.
Clarkia elegans	"	" 12	" 4	16 in.	" 23 to Aug. 16.
Celosia cristata (*Cockscomb*)	"	" 12	" 4	9 in.	July 17, Froze Sept. 21. Slightly injured by frost Sept. 16.
Candytuft (2 varieties)	"	" 12	" 4	14 in.	June 16 to Sept. 16.
Coreopsis (6 varieties)	"	" 12	" 4	1 in. 10 in. to 3 ft.	" 28 to frost, (Sept. 21.
Dimorphotheca (Orange daisy)	"	" 12	" 5	14 in.	June 23 to Aug. 30.
Dianthus	"	April 15	" 5		July 17 to frost Sept. 22.
Gaillardia (annual)	"	" 15	" 5	2 ft.	" 8 to frost (Sept.22)
Godetia (2 varieties)	"	" 15	" 5	5 in. to 13 in.	" 1 to Aug. 19.
Kochia (Summer Cypress)	"	April 15	5	2 ft. 6 in.	Ornamental leaved.
Larkspur (Annual) 3 types	"	" 16	" 5	2 ft. 4 in. to 3 ft.	July 19; dug up Oct. 7.
Linaria (2 varieties)	"	" 16	" 5	14 in. to 18 in.	June 15 to Sept. 22.
Lobelia (2 varieties)	"	" 15	" 5	4½ in. and 5 in.	July 1 to Sept. 22.
Marvel of Peru	"	" 16	" 5	3 ft. 2 in.	" 28 to frost, Sept. 21.
Malope (2 varieties)	"	" 16	" 5	2 ft. and 3 ft.	" 17 to Sept. 22.
Marigold (2 varieties)	"	" 16	" 8	1 ft. and 2 ft.	June 16 to Sept. 22.
Nemesia (5 varieties)	"	" 15	" 5	9 in. to 11 in.	" 28 to frost (Sept.22)
Nigella (Miss Jekyll)	"	" 16	" 5	15 in.	July 26 to Aug. 15.
Nasturtiums (12 vnrieties)	Outside	May 22			Full bloom Aug. 8. Froze Sept. 21.
Phlox Drummondii (7 varieties)	Hotbed	April 15	" 5	9 in. to 2 ft.	June 23; dug up Oct. 7.
Pansies (3 varieties)	"	" 15	" 5	6 in. to 8 in	" 23; dug up Oct. 7.
Petunia (3 varieties)	"	" 15	" 5	14 in. to 19 in.	" 28 to Sept. 30
Portulaca	"	" 16	" 5	8 in.	July 1 to Sept. 21.
Salvia	"	" 16	" 5	20 in.	" 28 to Sept. 20.
Sweet Sultan (3 varieties)	"	" 16	" 5	16 in. to 3 ft. 2 in.	" 3 to Sept. 21.
Stocks (10 week)- 12 varieties	"	" 15	" 5	14 in. to 16 in.	" 1; dug up Sept. 22
Salpiglossis (6 varieties)	"	" 15	" 5	3 in. to 3 ft. 3 in.	"July 2 to frost Sept.22
Scabiosa (6 varieties)	"	" 15	" 5	2 in. to 10 in.	July 28 to Sept. 13.
Sweet Peas (102 varieties)	Outside	" 22		18 in. to 4 ft.	" 4 until dug up Oct
Verbena (7 varieties)	Hotbed	" 15	" 6	12 in. to 18 in.	" 17 until dug up Oct. 7.
Viola (4 varieties)	"	" 15	" 6	9 in. to 12 in.	June 23; until dug upOct.

DISTRIBUTION OF SAMPLES OF POTATOES.

A free distribution of 269 samples of seed potatoes, 3 pounds per sample, was made to applicants in the province of Manitoba.

ARBORETUM.

No additions have been made to the arboretum this season, but the usual notes regarding wintering, season's growth, etc., have been made. No serious injuries have been noted except some depredations from leaf-destroying insects. The Spruce Bud Worm (*Tortrix fumiferana*) has done considerable damage to both the white and blue spruce trees. The Manitoba maple, ash, elm have also suffered, but in a lesser degree, from insects peculiar to them. The growth this season has, on the whole, been very good, and no losses have been recorded.

Owing to the hot dry weather that prevailed during the early part of June, the flowering period of the flowering shrubs was somewhat shortened. Nevertheless, there being a variety of each of the kinds of shrubs, a continued bloom was maintained throughout the flowering season.

FLOWERING SHRUBS.

Quite a number of varities of Lilac (*Syringa*) are under test; Common lilac (*Syringa vulgaris*) bloomed from May 31 to June 12. *Syringa Josikaea* or Josika's lilac bloomed from June 9 to June 25, *Syringa villosa*, a Chinese lilac, from June 14 to June 26, and *Syringa amurensis* from June 21 to June 30. With their beautiful foliage the lilacs make splendid specimen shrubs all the growing season.

"LONICERA TATARICA" (TARTARIAN HONEYSUCKLE).

The different types of this variety of bush honeysuckle have proven quite hardy, and give a wealth of fragrant bloom: the flowering season for these is from June 2 to 17.

CARAGANA.

The different forms of Caragana gave an abundance of bloom, but only for a short season. This year the bloom was from May 29 to June 7 for *Caragana arborescens* or Siberian pea tree, This is the largest of the Caraganas.

Caragana grandiflora and *Caragana frutescens* are smaller in size; they bloom about the same time as *Caragana arborescens*. *Caragana pygmæa* is much smaller than the preceding type and blooms June 5 to 20. It is grown principally for its fine foliage.

NINEBARK (PHYSOCARPUS).

This shrub kills back badly during the winter but usually produces a fair amount of bloom. Both *Physocarpus* (Neillia) *opulifolius* and *opulifolius aureus* bloomed from June 16 to 28.

VIBURNUMS.

Snowball (*Viburnum Opulus sterile*) was the most prolific bloomer of all the flowering shrubs. It was a mass of snowy white flowers for a considerable period—

June 9 to 23. While the snowball has not bloomed every season on this Farm, it is well worthy of a place in any collection of shrubs. The Wayfaring tree (*Viburnum Lantana*) kills back badly some seasons; it blooms May 29 to June 5. The Highbush cranberry (*Viburnum Opulus*) does very well, and the red berries in the autumn add to the beauty of the shrubbery. The season for blooming, both for it and the sheepberry (*Viburnum lentago*) is June 5 to 17.

SPIRAEAS.

There are a number of varieties of spiraea in the arboretum. Those that stand the winter fairly well are: *Spiraea Van Houttei, Spiraea hypericifolia,* and *Spiraea Billardii*; these bloomed from June 1 to 23.

Quite a large number of other species are under test; the above are a few of the more commonly-grown flowering shrubs.

HEDGES.

It has always been the practice on this Farm to test out hedges for windbreaks as well as for ornamental purposes. At the present time about twenty are under test, and no part of the arboretum is the subject of more comment from visitors. The newer and smaller hedges are located on the south side of the drive between the superintendent's residence and the barns, while a few of the older hedges are on the north side of the drive. Of the latter, the white spruce (untrimmed) is the largest, about 17½ feet high and 7 feet across. The result of cultivation is well illustrated in the growth of the spruce hedge: where one end was cultivated, and the other end not cultivated, the latter is only about half the size of the cultivated part. A trimmed hedge of *Caragana arborescens* is now 16 feet high and 5 feet across; both these hedges are now almost wind proof.

The following list is given as quite a number of inquiries are received regarding suitable material for hedges:—

	Variety.	Winters.	Density.	Growth.	Size.	Remarks.
1.	*Syringa vulgaris* (Charles X. Lilac)	Well	Medium	Medium	10 ft. by 7 ft.	Untrimmed. Makes a fairly dense hedge. Foliage remaining on until late autumn.
2.	*Pyrus baccata* (Siberian crab)	Badly	"	"	7 ft. by 4 ft.	Not suitable for hedge making.
3.	*Lonicera tatarica* (Tartarian honeysuckle)	Well	Dense	Slow	5½ ft. by 4 ft.	Makes a symmetrical hedge.
4.	*Caragana frutescens* (Woody Caragana)	Well	Dense	Slow	4½ ft. by 3 ft.	Very suitable for low hedge.
5.	*Artemisia Abrotanum* (English southernwood)	Badly	Medium	Rapid	2 ft. by 5 ft.	Kills back every winter. Makes rapid growth in summer.
6.	*Shepherdia argentea* (Buffalo berry)	Medium	Dense top, open bottom	Slow	5½ ft. by 3 ft.	Beautiful silvery leaves, but too open at bottom of hedge.
7.	*Celtis occidentalis* (Nettle tree)	Well	Open	Rapid	6½ ft. by 4½ ft	Makes a very handsome hedge while in leaf.
8.	*Syringa Josikæa* (Josika's lilac)	Well	Dense	Medium	4½ ft. by 3½ ft.	Symmetrical, makes a very good ornamental hedge.
9.	*Crataegus coccinea* (Native hawthorn)	Well	Very dense	Slow	3 ft. by 16 in.	Slow growing.
10.	*Fraxinus pennsylvanica lanceolata* (Green Ash)	Well	Medium dense	Slow	6 ft. by 4 ft., 4 in.	Dense top, but open bottom.
11.	*Prunus americana* (Native plum)	Badly	Medium dense	Slow	5 ft. by 3 ft., 4 in.	Not a handsome hedge. Too open at bottom.
12.	*Acer tataricum Ginnala* (Ginnalian maple)	Medium	Thorny, dense	Medium	5½ ft by 4½ ft	Bushy form and has beautiful foliage.
13.	*Rhamnus cathartica* (Common buckthorn)	Badly	Medium	"	5 ft. by 2 ft., 8 in.	A fair hedge, thorny nature.
14.	*Thuya occidentalis* (Arbor vitæ or White cedar)	Well	Dense	Slow	2½ ft. by 2 ft. 10 in.	Quite hardy since the other trees protect it somewhat.
15.	*Caragana arborescens* (Siberian pea tree)	Well	Dense	Medium	7 ft. by 4 ft., 4 in.	Makes an excellent hedge. Twigs wiry, consequently a little hard to trim.
16.	*Picea canadensis (alba)* (White spruce)	Well	Very dense	Slow	4 ft., 8 in. by 3 ft., 6 in.	Beautiful hedge, stands crowding well, being green from top to bottom.
17.	*Corylus rostrata* (Beaked hazel nut)	Medium	Very open	"	4 ft. by 2 ft. 3 in.	Not suitable for a hedge.
18.	*Amelanchior alnifolia* (Saskatoon)	Well	Open	"	4 ft., 8 in. by 2 ft. 4 in.	Too open and straggly for a hedge.
19.	*Symphoricarpus occidentalis* (Western snowberry)	Well	Medium dense	"	2 ft. by 1 ft. 5 in.	Only suitable for low hedge.

EXPERIMENTAL STATION FOR SOUTHERN SASKATCHEWAN, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, T. J. HARRISON, B.S.A.

During the year, Mr. Angus Mackay, who for twenty-six years was Superintendent of this Farm, resigned and accepted the position of Inspector of Western Experimental Farms. While in charge he did much for the advancement of horticulture, not only in southern Saskatchewan but in the whole Canadian Central West. He transformed a portion of this Farm from a bare waste of prairie to a veritable park of shelter belts, hedges, drives, lawns, and flower gardens. The horticultural grounds will forever be a monument to the great work he has accomplished for the West.

Although much has been done, there is much still to do, for at present there is a scarcity of western data on horticulture. Our immense correspondence shows the great interest that is being taken by the farmers in this line of farming.

WEATHER CONDITIONS.

On the whole the season of 1913 was favourable for the growth of all classes of horticultural crops. The spring was early, with no damaging frosts to affect the fruit blossoms. May was mild and bright which facilitated the early planting of the vegetables and annual flowers. Eight and one half inches of rain fell in June and July, stimulating a luxurious growth in the vegetable and flower gardens. The large amount of sunshine in August and September had the effect of ripening the fruit and vegetables before the fall frosts damaged them. A hail-storm in the late summer damaged the apple crop to some extent, thus lowering its value. The fall was warm and bright, causing an abundant bloom in the flower gardens until killed by the frosts in October.

VEGETABLE TESTS.

ASPARAGUS.

A good crop was obtained from the old beds of Barr's Mammoth, Barr's Elmira, and Conover's Colossal. In use from May 5 to August 6. Three new varieties, Palmetto, Columbia Mammoth, and Colossal were sown on May 5. The seed came up on June 12 and made a strong growth during the season. These plants will be transplanted to permanent beds in the spring of 1914.

BEANS—Sown in the garden May 16.

Variety.	In use.	Ripe.	Remarks.
Early Refugee	Aug. 20	Sept. 4	Poor crop.
Valentine	July 28	" 19	"
Kenney's Rustless Wax	" 28	.....	Did not ripen.
Wardwell's Kidney Wax	Aug. 3	Aug. 30	Poor crop.
Stringless Green Pod	July 28	Sept. 4	"
Bountiful	" 25	Aug. 30	"
Refugee	" 20	" 20	"

BEETS—Sown May 3, pulled October 1.

Variety.	In Use.	Yield per acre.
		Bush. Lb.
Eclipse	July 18	792 40
Ruby Dulcet	" 16	783
Meteor	" 16	631 20
Black Red Ball	" 28	715 20
Early Blood Red Turnip	" 22	773 20
Egyptian Dark Red Turnip	" 26	676 40

BRUSSELS SPROUTS.

Sown in the hothouse April 17; transplanted in the garden May 28; in use September 9; average weight per head 3 pounds; very satisfactory.

Yields of vegetables were computed from the weights obtained from one row 30 feet in length.

CABBAGE—Sown in hothouse March 24; set out in garden May 26; taken up October 3.

Variety.	In use.	Average weight of one head.	Remarks.
		Lb.	
Small Erfurt	Aug. 2	4	Good crop.
Winningstadt	" 8	10	"
Lubeck	July 27	6	"
Magdeburg	Aug. 7	9	"
Copenhagen Market	July 27	15	"
Early Jersey Wakefield	" 29	11	"
Early Paris Market	Aug. 2	4	"
Large Late Flat Drumhead	" 26	11	"
Extra Early Summer Savoy	" 2	5	"
Fottlers Improved Brunswick	" 15	13	"
Danish Delicatesse Red	Sept. 30	4½	"
Red Danish Stonehead	" 20	4	"
Danish Summer Ballhead	Aug. 26	5	"
Extra Amager Danish Ballhead	" 10	5	"
Copenhagen Market	July 27	9½	"
Imp. Amager Danish Ballhead	Aug. 10	8	"
Flat Swedish	" 15	9	"

CAULIFLOWER—Sown in hothouse April 14; set out in garden May 28.

Variety.	In use.	Average Weight.	Remarks.
		Lb.	
Danish Giant	Aug. 10	6	Good crop.
Early Snowball			Did not germinate.
Extra Selected Dwarf Erfurt	Aug. 6	7	Good crop.

INDIAN HEAD.

CELERY—Sown in hothouse March 24; transplanted June 12 in trenches 18 inches deep, 9 inches of well rotted manure in bottom of trench and 6 inches of soil on top of manure.

Variety.	In use.	Weight per dozen heads.
		Lb.
Evans' Triumph	Sept. 9	15
French Success	" 20	30
White Plume	" 2	22
Noll's Magnificent	" 10	21
Paris Golden Yellow	" 22	23
Giant Pascal	" 20	24
Rose Ribbed	" 23	18

CARROTS.—Sown in garden April 28; pulled October 1.

Variety.	In use.	Yield per acre.		Remarks.
		Bush.	Lb.	
French Horn	July 15	715	20	Good crop.
Improved Nantes	" 15	792	40	"
Half Long Chantenay	" 20	773	20	"

CITRON—One variety, Colorado, was sown in the hothouse April 1. None of the seed germinated, so that no results can be given.

CUCUMBERS—Sown in the hothouse April 1; transplanted in garden May 28; all varieties gave a very satisfactory crop.

Variety.	In use.	Ripe.	Weight from three hills.
			Lb.
Giant Pera	Aug. 8	Aug. 20	30
Cool and Crisp	" 14	" 26	24
Extra Early Russian	" 6	" 20	42
Prize Pickling	" 8	" 20	50
Peerless White Spine	" 16	" 30	37

GARDEN CORN—Sown in garden May 27.

Variety.	In use.	—	Weight of twelve ears.
			Lb.
Early Evergreen	Sept. 10		5
Perkins Early	" 16		6
Early Malcolm	Aug. 22		7
Golden Bantam	" 28		4
Fordhook Early	" 30		7
Extra Early Adams	Sept. 4		6
Early Iowa	Aug. 28		8
Metropolitan	Sept. 9		10
Squaw (Indian Head seed)	Aug. 20		6
Squaw (from Rennie)	Sept. 9		6

EGG PLANT—The seed was sown in the hothouse on April 1, and the plants were transplanted in garden on June 13. No fruit matured.

CRESS (Extra Curled)—Sown in garden on April 28. In use June 10.

PEPPER (Long Red Cayenne)—Sown in hothouse April 1. Transplanted in garden on June 13. No fruit matured.

SUMMER SAVORY—Sown in garden May 5. Ready for use August 2.

SAGE—Sown in the garden on May 5. Ready for use August 20.

LETTUCE—Sown in garden on April 28 and May 27. First seeding in use June 14. Second seeding in use July 6.

Variety.	Remarks. First seeding.	Remarks. Second seeding.
Red Edged Victoria	Good heads	Good heads.
Black seeded Simpson	"	"
Gant Crystal Head	"	"
Grand Rapids	"	"
Improved Hanson	"	"
Crisp as Ice	Extra good	Extra good.
All Head	Medium heads	Medium heads.
Iceberg	Extra large	Large heads.
Summer	Good heads	Good heads.

PARSLEY.—Two varieties, Double Curled and Triple Curled, were sown in the garden on May 5. Ready for use July 10. Both varieties gave good crop. Triple Curled is recommended.

RADISH.—Two varieties, Turnip Scarlet and Early Scarlet White Tipped were sown in the garden on April 28, and a second seeding was made on May 19. The crop from the first seeding was ready for use on June 14. The crop from the second seeding was ready for use on June 26. Both these varieties gave satisfactory crops.

RHUBARB.—The old beds gave a good crop from May 19 up to June 28 when they were removed to make room for lawns. A new bed was planted out in the new enclosure set aside for the horticultural experiments. Victoria, Strawberry, and Myatt's Linnæus are varieties that are recommended.

INDIAN HEAD.

SALSIFY.—One variety, Long White, was sown in the garden on May 5. Ready for use September 20. Taken up on October 3. The crop was extra good.

SPINACH.—Two varieties, Victoria and Bloomsdale, were sown in the garden on May 5. Ready for use on June 20. Victoria is recommended as a good variety.

SQUASH—Sown in hothouse April 7.

Variety.	Set out in garden.	In use.	Pulled.	Weight per 3 hills.
				Lb.
Delicious	May 28	Aug. 15	Oct. 3	33
Vegetable Marrow	" 28	July 25	" 3	194
Crookneck Squash	" 28	Aug. 20	" 3	42
Delicata	" 28	" 28	" 3	81
Custard Marrow	" 28	" 30	" 3	48
Long White Bush Marrow	" 28	" 2	" 3	104
Golden Hubbard	" 28	" 15	" 3	113

ONIONS.

ONIONS.—Sown in garden April 26 in rows 15 inches apart. On account of the onion maggot attacking all varieties the crop was not satisfactory.

Variety.	Yield per acre.		Remarks.
	Bush.	Lb.	
White Queen	174		Poor crop.
Early Barletta	164	20	" "
Australian Brown	212	40	Medium crop.
White Pearl	193	20	" "
Red Early Flat	290		" "
Extra Early Red	154	40	Poor crop.
Large Red Wethersfield	188	30	" "
Dark Red Beauty	145		" "
Danvers Yellow Globe	222	20	Medium crop.

GARDEN PEAS—Sown in garden May 3.

Variety.	In Use.	Ripe.	Remarks.
Gregory's Surprise	July 8	Aug. 13	Good crop.
Nott's New Perfection	" 16	" 13	" "
Gradus	" 14	Sept. 4	" "
Thomas Laxton	" 8	Aug. 10	" "
Sutton's Excelsior	" 20	" 30	" "
Premium Gem	" 10	" 10	" "
McLean's Advancer	" 16	" 30	" "
Juno	" 28	Sept. 8	" "
Telephone	" 24	" 4	" "
Stratagem	" 30	" 2	" "
American Wonder	" 10	" 13	" "
Heroine	" 30	" 8	" "

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In the Arboretum, Indian Head, Sask.

The perennial Border, Indian Head, Sask.

PARSNIPS—Sown in garden April 26. Taken up October 2.

Variety.	Yield per acre.	Remarks.
	Bush. Lb.	
Hollow Crown	483 20	Excellent crop.
Guernsey	464	" "

PUMPKINS—Sown in hothouse April 1. Set out in garden May 28.

Variety.	In Use.	Weight from 3 hills.
		Lb.
Jumbo, or Mammoth King	Aug. 30	333
Connecticut Field	" 25	111

TOMATOES—Sown in hothouse on March 24. Set out in garden June 4.

Variety.	First ripe.	Weight from 3 plants.	Remarks.
		Lb.	
Prosperity	Aug. 28...	14	Medium crop.
Florida Special	" 28...	9	Light crop.
Chalk's Early Jewel	" 26...	10	Medium crop.
Sparks' Earliana	" 20...	9	Light crop.
Earliest	Sept. 1...	8	" "
North Adirondack	Aug. 12...	14	Medium crop.
Bonny Best	" 10...	8½	Light crop.
Alacrity 2-24-9 (C.E.F.)	July 26...	20	Heavy crop.
Alacrity 2-24-10 (C.E.F.)	" 28...	16	" "
Sunrise	Aug. 30...	10	Medium crop.
Earliana	" 1...	10	" "
Earliana (C.E.F.)	" 28...	14	" "

GARDEN TURNIPS—Sown in garden May 16. Taken up October 2.

Variety.	In Use.	Yield per acre.	Remarks.
		Bush. Lb.	
Early White	July 10...	1,266 20	Very heavy crop
Extra Early	" 10...	1,160	" " "
D. & F. Favorite	Aug. 16	1,392	" " "

POTATOES.

Twenty-six varieties of potatoes were tested in drills 30 inches apart, and the sets planted 4 to 5 inches apart in the drill.

POTATOES—Test of varieties.

No.	Variety.	Character of soil.	Date planted.	Date lifted.	Growth	Size.	Yield per acre.		Form and Colour.
							Bush.	Lb.	
1	Rawlings Kidney (Ashleaf Kidney)	Clay loam.	May 30.	Sept. 23	Strong.	Large...	281	40	oval, white.
2	American Wonder	" "	" 30	" 23	Medium	Medium	145		long, white.
3	Carman No. 1	" "	" 30	" 23	Strong.	Large...	195		oval, "
4	Everett	" "	" 30	" 23	" ..	" ..	251	40	long, pink.
5	Empire State	" "	" 30	" 23	" ..	" ..	175		long, white.
6	Early Northern	" "	" 30	" 23	" ..	"	358	20	long, red.
7	Early Hebron	" "	" 30	" 23	" ..	Medium	373	20	long, pink and white.
8	Dreer's Standard	" "	" 30	" 23	" .	Large...	431	40	oval, white.
9	Dalmeny Beauty	" "	" 30	" 23	"	" .	445		" "
10	Factor	" "	" 30	" 23	Medium	Medium	276	40	" "
11	Houlton Rose	" "	" 30	" 23	Strong.	Large...	558	20	" red.
12	Hard to Beat	" "	" 30	" 23	" ..	Medium	223	60	" white.
13	Late Puritan	" "	" 30	" 23	" ..	Large...	331	10	" "
14	Irish Cobbler	" "	" 30	" 23	" ..	" .	354	10	round, white.
15	Money Maker	" "	" 30	" 23	" ..	" ..	345		" "
16	Morgan Seedling	" "	" 30	" 23	" ..	" ..	367		" pink.
17	New Queen	" "	" 30	" 23	" ..	" ..	392		oval, pink and white.
18	Rochester Rose	" "	" 30	" 23	" ..	" ..	333	20	oval, red.
19	Reeves' Rose	" "	" 30	" 23	" ..	" ..	382		" "
20	Table Talk	" "	" 30	" 23	" ..	" ..	390		" white.
21	Vick's Extra Early	" "	" 30	" 23	" ..	" ..	355		" pink and white.
22	Gold Coin	" "	" 30	" 23	" ..	" ..	540		" white.
23	Wee MacGregor	" "	" 30	" 23	" ..	" ..	483	20	" "
24	*Bermuda Early	" "	" 30	" 23	" ..	" ..	43	20	" red.
25	Eureka Extra Early	" "	" 30	" 23	" ..	" ..	525		" white.
26	*Early Ohio	" " "	" 30	" 23	" ..	" ..	36	40	" red.

*Evidently seed was poor as very few came up.

SMALL FRUITS.

Early in the season the old plantation of small fruits was removed in order to make room for lawns. A new plantation was set out in which six specimens of each variety of currants and raspberries, and three specimens of each variety of gooseberry were planted. A list of the different varieties is given below.

RED CURRANTS.

6 Greenfield Red.
6 Pomona.
6 Perfection.
6 Red Dutch.
6 Red Grape.
6 Red Cross.
6 Rankins Red.
6 Victoria Red.
6 Wilder.

WHITE CURRANTS.

10 White Grape.
6 White Cherry.
12 Large White.
6 Verrieres White.
6 White Imperial.

INDIAN HEAD.

BLACK CURRANTS.

6 Boskoop Giant.
6 Climax.
6 Collins Prolific.
6 Clipper.
6 Eagle.
6 Dominion.
6 Eclipse.
6 Magnus.
6 Kerry.
6 Saunders.
6 Victoria Black.

GOOSEBERRIES.

2 Ruth.
3 Downing.
3 Ramsay.
3 Smith's Improved.
3 Richland.
3 Houghton.
3 Red Jacket.
3 Mabel.
3 Rideau.
3 Silvia.
3 Carman.
3 Pale Red.

BLACK RASPBERRIES.

6 Hilborn.

RASPBERRIES.

6 Early King.
6 Golden Queen (White).
6 Marlboro.
6 Dr. Reider.
6 Snyder.
6 Cuthbert.
6 Sunbeam.
6 Herbert.

PLUMS.

The old plum orchard which was set out in 1894 was this year cut out to allow of a new arrangement of the grounds. These trees which were of the native Manitoba variety, gave heavy crops of fruit almost every season, but, as a rule, the early fall frosts destroyed the fruit before it had ripened. In 1908 a number of cross-bred varieties were received from Professor Hansen, of Brookings, South Dakota. These were set out and are standing the winters well. Several varieties have fruited, giving large plums of good flavour.

APPLES.

Up to the present experiments with the larger varieties of apples have not led to very great success, probably on account of the fact that the stock used has been grown in eastern nurseries until two or three years old and then shipped west and planted. As a rule these trees winter-kill the first season and those that do survive receive a bad check so that they are useless for experimental work.

In order to try and overcome the above difficulty by acclimatizing the young trees, some 3,000 seedlings were received from the Central Experimental Farm at Ottawa, in the spring of 1912. These were planted in nursery rows and have survived their first winter without killing back in the least. This spring a further shipment of 800 seedlings was received and planted in the nursery. In this way it is hoped to secure hardy stock that will stand transplanting to the orchards without killing back the first winter. Below is a list of those varieties now in the nursery:—

1912.

600 Anis seedling.
550 Antonovka seedling.
525 Beautiful Arcade seedling.
55 Hibernal seedling.
220 Tetofsky seedling.
160 Duchess "
450 Charlamoff "
350 Yellow Transparent seedling.

1913.

125 Handsome white seedling.
516 Blushed Calville "
44 Angus "
94 Patten Duchess "
139 Patten Greening "

In addition to the above, fifty 2-year old apple trees were obtained from Mr. A. P. Stevenson, of Dunstan, Man. These were planted out in the orchard and made a good growth during the past season. Below is a list of those obtained:—

5 Hibernal.
5 Blushed Calville.
5 Charlamoff
5 Anisette.
5 Repka Kislaga.
5 Volga Anis.
5 Wealthy.
5 Whitney Crab.
5 Transcendent Crab.
5 Hyslop Crab.

CROSS-BRED APPLES.

A record was kept of the weight of fruit gathered from some of the best trees, and is given below. The date of picking was September 11 to 13.

Orchard.	Row.	Record. No.	Variety.	Year planted.	Year began fruiting.	Weight of fruit.	Average Diameter.
						Lb.	inch
No 3	1	229	Novelty..	1902	1910	9½	1
" 3	2	244	Eve	1904	1911	12	1¼
" 3	4	280	Charles...	1906	1911	32	1½
" 3	5	295	Aurora....	1902	1909	70	1
" 4	3	405	Cavan.....	1901	1908	34	1¼
" 4	4	420	Ruby ..	1903	1911	25	1¼
" 4	5	436	Charles...	1903	1909	126	1½
" 4	5	437	"	1903	1909	107	1½
" 4	5	438	"	1903	1909	42	1½
" 4	5	439	"	1903	1909	36	1½
" 5	6	611	Derby.....	1904	1911	56	1
" 5	11	670	Jewel.....	1907	1911	15	1½
" 5	13	695	Stork.....	1905	1909	36	¾
" 5	20	787	Jewel.	1908	1912	20	1½
" 6	2	893	Pioneer.	1905	1911	12	1
" 6	2	898	Charles...	1905	1911	28	1½
" 6	3	904	Tony...	1905	1911	30½	1
" 6	3	911	Eve.	1905	1911	26	1
" 6	5	928	Prince..	1905	1913	72	1¼
" 8	8	1281	Jewel...	1908	1912	56	1½
" 8	8	1283	"	1908	1912	22	1½
" 8	9	1297	"	1908	1912	32	1½
" 8	10	1305	Edna...	1906	1911	22	1
" 8	18	1437	Columbia...	1906	1912	40½	1¼

ANNUAL FLOWERS.

Variety.	Transplanted in garden.	In bloom From	In bloom To	Remarks.
Asters (9 varieties)	June 2	July 15	Sept. 14	Good.
Asters (25 varieties)	" 2	" 24	Oct. 4	"
Antirrhinums (18 varieties)	" 2	" 15	Sept. 15	Fair.
Alonsoa	" 5	" 14	Aug. 20	Good.
Balsam	Seed did not germinate.			
Brachycome	"	"		
Clarkia	June 6	Aug. 15	Sept. 2	"
Celosia	July 4	July 21	Aug. 20	"
Celosia (mixed)	" 4	" 4	" 20	Fair.
Eschscholtzia	" 6	" 6	" 21	Good.
Dimorphotheca	" 6	" 2	July 30	"
Coreopsis (6 varieties)	" 6	" 6	Aug. 20	"
Larkspur (3 varieties)	" 6	" 29	Sept. 2	"
Linaria	" 6	Aug. 2	Aug. 28	Medium.
Marvel of Peru	" 4	July 22	" 20	Good.
Mignonette	" 6	" 25	" 30	Medium.
Nemesia	" 2	" 26	" 30	Good.
Nasturtiums (5 varieties)	" 3	" 18	" 30	"
Phlox (7 varieties)	" 4	" 10	" 30	"
Petunias (3 varieties)	" 3	" 3	" 30	"
Verbenas (6 varieties)	" 2	" 3	" 30	"
Salvia	" 6	" 30	" 20	Fair.
Cosmos (mixed)	" 6	" 12	" 26	Good.
Lobelia	" 6	" 12	" 26	"
Pansies	Seed did not germinate.			
Viola	"	"	"	
Stocks	"	"	"	
Sweet Peas (18 varieties	Sown Apr. 19	July 10	Aug. 30	Good.
Nigella	June 6	Aug. 2	" 25	Medium.
Alonsoa	" 5	July 20	" 25	"
Candytuft	" 5	Aug. 30	" 30	"
Chrysanthemum	Seed did not germinate.			
Anthus	"	"		
Gaillardia	June 6	July 28	Aug. 30	Good.
Godetia	" 5	Did	not bloom	
Linaria (mixed)	" 6	Aug. 2	Aug. 26	Medium.
Lobelia	" 6	June 28	" 11	Good.
Lupines (mixed)	" 6	" 28	" 30	"
Malope (crimson and white)	" 5	Aug. 16	Sept. 2	"
Marigold (African mixed)	" 6	" 2	" 3	Medium.
Marigold (French dwarf)	" 6	July 15	Aug. 30	Good.
Poppy (4 varieties)	" 6	Aug. 10	Sept. 16	Medium.
Portulaca (double mixed)	" 6	June 20	Aug. 26	Good.
Sweet Sultan (mixed)	" 5	July 28	Sept. 1	"
Verbena (mixed)	" 2	" 10	" 2	"
Viola	Did not germinate.			
Pansy (extra choice)	"	"	"	
Acroclinium (Dbl. Rose)	June 5	June 26	Sept. 28	Fair.
" (Sgl. Rose)	" 5	" 20	" 28	"
" (Sgl. White)	" 5	" 24	Oct. 2	Good.
Rhodanthe (mixed)	" 6	Did	not bloom	
Ammobium alatum	" 4	" 30	Sept. 30	"
Gomphrena (mixed)	" 6	July 15	" 30	"
" (variegated)	" 6	" 18	Oct. 4	"
Helichrysum (mixed)	" 6	" 7	Sept. 28	"
Calliopsis	" 4	" 30	Oct. 4	Medium.
Stocks (Virg. Mixed)	" 4	" 1	Aug. 30	Good.

PERENNIAL FLOWERS.

Early in the season the old perennial beds were removed in order to allow of a new arrangement of lawns and drives. These old plants, along with a number of new varieties received from the Central Experimental Farm, were planted in a border which is 12 feet wide and extends for 429 feet on the north and west sides of the inclosure. An arrangement of these plants has been made, as to height and colour, that will undoubtedly give a very fine appearance when they are in full bloom.

A list of the old perennials that flowered after being removed is given below:—

Variety.	In bloom		Remarks.
	From	To	
Hesperis	June 15	Aug. 15	Good show of bloom.
Comfrey	" 26	Sept. 19	" " "
Sweet William	" 20	Aug. 30	" " "
Iris	" 18	July 2	" " "
Geranium	" 26	Sept. 2	" " "
Clematis	" 26	Aug. 24	" " "
Yarrow	" 25	Sept. 20	" " "
Lupinus	" 26	" 19	" " "
Dianthus	" 25	" 30	" " "
Columbine	" 14	July 15	" " "
Chrysanthemum	" 20	" 16	" " "
Paeony 0-921	July 28	" 10	" " "
" 0-920	" 14	" 28	" " "
Tiger Lily	" 4	" 28	" " "
Thalictrum	June 15	Aug. 10	" " "
Hemerocallis	July 11	" 15	" " "
Veronica	" 15	Sept. 10	" " "
Lychnis	" 14	Aug. 20	" " "
Spiraea	" 15	" 28	" " "
Canterbury Bell	" 26	Sept. 25	" " "
Delphinium	July 24	" 20	" " "
Platycodon 0-727	" 28	" 20	" " "
Aconitum	" 24	" 10	" " "
Sunflowers	Aug. 1	" 20	" " "
Phlox	" 16	" 25	" " "
Spiraea japonica	July 4	Aug. 8	

BULBS.

In the fall of 1912 some 3,800 tulips, narcissus, and crocus bulbs were received from the Central Experimental Farm, Ottawa, and planted in beds in front of the Superintendent's house. These commenced to bloom on May 22, and were in bloom on June 2, making a very fine show of bloom.

On October 21, 1913, 2,700 tulips, comprising thirteen varieties, were received from the Experimental Farm at Ottawa and planted in beds in different parts of the grounds.

CANNAS.

On May 10, twenty varieties of cannas were received from the Central Experimental Farm, Ottawa. These were planted out on June 3 and bloomed from August 16 to September 15.

INDIAN HEAD.

TREES AND SHRUBS.

All varieties made a good growth during the season. A list of those that bloomed is given below:

Variety.	In bloom	
	From	To
Lilacs.		
Syringa vulgaris	June 1	June 15
Syringa villosa	" 10	" 18
Marie Legraye	" 1	" 21
Abel Carriere	" 1	" 20
Madame Lemoine	" 1	" 13
Alphonse Lavallee	" 1	" 14
Madame Casimir Perier	" 2	" 16
Emile Lemoine	" 1	" 14
Charles X	" 3	" 15
Jacques Calot	" 2	" 16
La Tour d'Auvergne	" 1	" 15
Charles Joly	" 2	" 17
Michel Buchner	" 4	" 18
Congo	" 6	" 20
Condorcet	" 2	" 18
Other Varieties of Shrubs.		
Prunus demissa	May 28	June 12
Pyrus betulaefolia	" 23	" 4
Lonicera tatarica splendens	June 4	" 20
Spiraea arguta	May 28	" 9
Euonymus lincaris	Aug. 10	Sept. 19
Sambucus	June 2	June 13
Lonicera gracilipes	" 6	" 26
Lonicera Morrowi	" 1	" 22
Lonicera bella	" 1	" 24
Viburnum prunifolium	" 3	" 21
Pyrus americana	" 1	" 16
Syringa	" 1	" 15
Caragana arborescens	May 28	June 22
Caragana frutescens	" 28	" 14
Caragana Redowskii	" 27	" 14
Caragana pygmaea	June 4	" 17
Caragana grandiflora	May 27	" 12
Caragana mollis glabra	" 28	" 14
Crataegus coccinea	" 26	" 13
Thuya occidentalis	June 3	" 16
Crataegus sanguinea	" 4	" 13
Pyrus baccata	May 27	" 10
Sambucus nigra	June 1	" 12
Spiraea japonica	June 24	Sept. 6
Viburnum Lentago	" 6	June 20

DISTRIBUTION OF SAMPLES.

Each spring a free distribution of samples of the products of the Horticultural Department is made to residents of southern Saskatchewan. These samples comprise trees, shrubs, small fruit cuttings, tree and shrub seeds, flower seeds, and rhubarb roots. Below is given a list of these sent out during the past season:

Trees, 682 packages containing 75 seedlings.

Shrubs, 565 packages containing 50 assorted shrubs.

Tree seeds and shrub seed, 115 packets containing 1 pound of maple, ash, and caragana seed.

Flower seeds, 184 packages containing 3,312 packets of hardy annual and perennial flower seeds.

Rhubarb roots, 208 packages containing 6 roots each of the most suitable varieties.

I desire to express my appreciation and thanks to my gardener, B. Goldsmith, who is a painstaking workman, and to my bookkeeper, Geo. Lang, who has done much to make the work of this branch successful. While the office work of necessity takes the greater part of his working hours, he spends considerable time in the horticultural grounds collecting data and studying the growth of different plants.

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Experimental Hedges, Indian Head, Sask.

EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, W. A. MUNRO, B.A., B.S.A.

The horticultural work at this Station was vitalized in the season of 1913 by the employment of a qualified gardener, Mr. Wm. Godfrey, of Newcastle, England. Added to this is the advantage of the effectiveness of windbreaks that have been planted for some time, but until this year were not large enough to be of any service as a protection. Caragana hedges planted in 1911 are now about 4 feet high, and the currant and raspberry bushes planted the same season are a protection to themselves as well as to the nearby vegetables and strawberries.

There was not so much moisture from March to August as in the corresponding period of the previous two seasons, by over 4 inches, and the latter parts of May and June were especially dry. Nevertheless, none of the crops suffered to any great extent and the rain of July and August revived them.

EVERGREENS.

Every spring since 1909 we have been receiving evergreens, particularly varieties of spruce and pine, from various nurseries, and only a small percentage have lived. The trees were of various sizes from seedlings 3 inches high to trees 2 feet high. The trouble evidently was because of the difficulty in shipping them such long distances, and at the same time keeping the roots moist. More success was attained by obtaining native black and white spruce in their natural environment north of Duck lake, 21 miles from the Experimental Station. In 1911, forty-one trees were obtained, forty of which are still alive. In 1912, 157 were similarly obtained and 156 grew. In 1913 we secured 116, and present indications are that only two will die. The trees obtained were of height varying from 1 to 7 feet.

FLOWERS.

In the autumn of 1912 we potted upwards of 300 tulip bulbs and placed them in a dry cool cellar. They were well watered at time of storing and watered at intervals of about two weeks all winter. Two weeks before Christmas holidays we began taking them up, one or two at a time. After removing a pot from the cellar it was placed in a dark part of the room, and after a few days brought a little nearer a window. In two weeks a bud appeared and in three to five weeks the plant was in full bloom. By bringing the bulbs up at intervals throughout the winter, there was a constant bloom of tulips in the house from Christmas until Easter. Of upwards of twenty-five varities tried in this way there was not one but came to good bloom.

A small number of hyacinths and narcissi were treated similarly with equally good results.

The border around most of the lawn and including a length of nearly one-quarter of a mile was first completely planted in 1913. The shrubs behind the border are of sufficient growth to afford a splendid background, and altogether the setting was good. The flowers of particular value are tulips, Iceland poppy, pinks, nasturtiums, pansies, and later in the season asters, irises and dahlias.

BUSH FRUITS.

The work in small fruit culture at this Station has not been conducted sufficiently long to be of much value as a test of varieties. The difficulty has been to get anything started, and even yet we have no gooseberries. Black currants planted in 1911 yielded a small crop in 1913, and so with the red and white currants. Better results were obtained from the raspberries. Following are the yields for 1913 of the raspberries under experiment that were planted in 1911:—

Variety.	No. of Bushes.	Yield in Pints.
Turner	15	9½
Loudon	23	32½
King	23	7
Sunbeam	22	19½

To protect the raspberries from danger of frost they were bent over in the autumn and the tips were weighted with a shovelful of earth, and over the whole again was placed a layer of straw 1 foot in thickness, and the straw was held in place by poplar poles. In the spring, after the snow had left they were uncovered and nothing more was done the remainder of the season than keeping the weeds down. After the berries were picked the canes that had fruited were removed.

STRAWBERRIES.

Difficulty has been experienced in obtaining a start in strawberry culture. The plants received from a distance are usually pretty much dried, and out of fifty we could not get more than from three to ten to grow. However, by nurturing these carefully and using the runners for new plants we have a start in a new variety the second year after receiving the plants. As a consequence of this difficulty all the rows of the different varieties are not complete and the comparison in point of yield is hardly reliable. The following table giving the number of plants in the different rows and the yields of the same, will give a fair idea of what may result from a small patch of strawberries:—

Variety.			No. of Plants in row.	Yield in pints.
Dakota	Planted in	1911	50	41½
Senator Dunlap	"	"	2	1
Parson's Beauty	"	"	100	22
Haverland	"	1912	50	8½
Enhance	"	"	50	3
Clyde	"	"	20	5
Crescent	"	"	50	3
Warfield	"	"	50	14
Glen Mary	"	"	50	3½
Ruby	"	"	24	3
Wm. Belt	"	"	50	11

The season of 1913 was the first in which we had a crop of strawberries. It was also the first season in which the winter mulch of straw was left in place later than

ROSTHERN.

the first of May. The plants are protected for the winter by covering them by a foot of clean straw in the autumn. In the spring of 1913 this mulch was not lifted until nearly the first of June. The plants were green and fresh when uncovered, and by being uncovered so late were in no way injured by the late spring frosts.

VEGETABLES.

Hotbeds and cold frames were constructed in accordance with directions given in pamphlet No. 4 by Mr. W. T. Macoun, Experimental Farm, Ottawa. These were operated as early as the season permitted. The seed was sown in the middle of April. Marked success was attained, particularly in the starting of cabbage, cauliflower, tomatoes, squash, vegetable marrow, celery, and cucumbers. It is not necessary to use the hotbed in the starting of such vegetables as beets, beans, carrots, parsnips, corn, peas, and turnips. The yield of cabbage, cauliflower, Brussels sprouts, celery, and roots such as carrots, parsnips, and turnips is so entirely satisfactory that there is no doubt of the great possibilities for the growing of these crops on a large scale in this country.

Success was attained this year in the production of tomatoes, squash, cucumbers, and corn, but the season being unusually long, and the plants having been given every possible attention, it is questionable whether these can be relied upon as regularly profitable crops.

BEANS.

Variety.	Weight of one row, 30 feet long.	
	lb.	oz.
Meteor	98	8
Egyptian Blood Red	101	2
Ruby Dulcet	84	14
Black Red Ball	50	11
Eclipse	99	11
Keeney's Rustless Wax	8	9
Valentine	4	14
Early Refugee	4	8
Refugee or 1000 to 1	1	2
Bountiful	3	10
Wardwell's Kidney Wax	2	0
Stringless Green Pod	1	3

CABBAGE.

Variety.	10 average heads.		Average weight per head.	
	lb.		lb.	oz.
Extra Amager Danish Ballhead	147	5	14	11½
Improved Amager Danish Ballhead	140	1	14	1½
Giant or Dryweather	128	14	12	14
Flat Swedish	128	7	12	13
Large Flat Drumhead	122	6	12	3½
Fottler's Improved Brunswick	106	9	10	10½
Early Paris Market	105	12	10	9
Copenhagen Market	97	13	9	12½
Danish Summer Ballhead	97	3	9	11½
Lubeck	89	10	8	15
Danish Delicatesse Red	88	6	8	13
Winningstadt	76	13	7	11
Small Erfurt	75	4	7	8
Red Danish Stonehead	74	12	7	7
Magdeburg	69	00	6	14
Early Jersey Wakefield	53	11	5	9
Extra Early Midsummer Savoy	42	15	4	4
Improved Danish Roundhead	15	12	1	9

ROSTHERN.

CAULIFLOWERS.

Variety.	Number of heads.	Weight.	
		lb.	oz
Erfurt Dwarf	85	165	8
Early Snowball	20	32	2

CARROTS.

Variety.	Weight of one row 30 ft. long.	
	lb.	oz.
Half Long Chantenay	68	00
Improved Nantes	56	9
French Horn	33	3

CELERY.

Variety.	Weight of one row 15 ft. long.	
	lb.	oz.
Evans' Triumph	79	00
French Success	65	8
Noll's Magnificent	42	1
White Plume	38	2
Giant Pascal	16	8
Paris Golden Yellow	15	8
Rose Ribbed Paris	13	4

CORN.

Variety.	Weight of ears from two rows each 30 ft.	
	lb.	oz.
Early Malcolm	33	15
Fordhook Early	21	2
Extra Early Adams	19	12
Early Iowa	15	12
Carter's Improved Sweet	13	12
Golden Bantam	6	5
Perkins Early	5	3

ROSTHERN.

CUCUMBERS.

Variety.	Two plants of each variety.
	Hotbed.
Giant Pera	131
Extra Early Russian	71
Peerless White Spine	66
Cool and Crisp	49
Prize Pickling	19

ONIONS.

Variety.	Weigh of one row 30 ft. long.			
	Good bulbs		Thicknecks	
	lb.	oz.	lb.	oz.
Large Red Wethersfield	16	1	31	15
Danvers' Yellow Globe	16	8	16	12
Salzer's Wethersfield	34	4	11	6
Johnson's Dark Red Beauty	2	4	12	8
Extra Early Red	34	3	10	6
Early Barletta	33	1	4	5
White Queen	29	3	2	10
White Pearl	26	3	4	6
Australian Brown	37	15	11	8
Red Early Flat	17	4	13	8

PARSNIPS.

Variety.	Weight.	
	lb	oz.
Hollow Crown	24	3

PEAS.

Variety.	Weight of one row 30 ft. long shelled.	
	lb.	oz.
Stratagem	3	8
Gradus	2	2
American Wonder	1	14
Juno	1	11
Nott's New Perfection	1	8
McLean's Advancer	1	7
Premium Gem	1	6
Heroine	1	5
Thos. Laxton	1	5
Gregory's Surprise		14
Telephone		14
Sutton Excelsior		7

SALSIFY.

Variety.	Weight of one row 30 ft. long.	
	lb.	oz.
Long White	31	15

SQUASH.

Variety.	Three hills of each variety.	
	No. of fruits.	lb. oz.
Long Vegetable Marrow	8	63 2
Carter's Trailing Vegetable Marrow	11	39 6
Long White Bush Marrow	5	26 2
Golden Hubbard	9	18 5
Summer Crookneck	8	9 13
Delicious	4	11 0

TOMATOES.

Variety.	Five plants of each variety.		
	No. of ripe fruits.	Weight of green fruits.	
		lb.	oz.
Bonny Best	10	5	4
Alacrity 2-24-9	7	5	4
North Adirondack Earliana	6	5	14
XXX Earliest Round	4	4	7
Alacrity 2-24-10	4	5	0
Sparks' Earliana (Sunnybrook Strain)	3	2	12
Rennie's Earliest	3	3	9
I.X.L.	3	3	10
Prosperity	1	4	12
Chalk's Early Jewel		3	4

TURNIPS.

Variety.	Weight of 30 ft. row.	
	lb.	oz.
D. & F. Favourite	98	14

POTATOES.

The results in the experiments with potatoes this year were rather disappointing in comparison with those of last year, for in some instances there seemed to be a contradiction in results. The variety tests of eleven leading varieties planted on summerfallow gave the following yields per acre for each of the past three years. The yield is based upon two rows each 78 feet long.

Variety	1911	1912	1913	3-year average.
	bush.	bush.	bush.	bush.
Dreer's Standard	528	840	596	654
Morgan Seedling	475	848	634	652
Rawlings Kidney (Ashleaf Kidney)	479	804	562	615
Everett	497	824	523	615
Money Maker	514	822	494	611
Rochester Rose	453	807	526	595
Late Puritan	431	699	529	553
Reeves' Rose	484	659	456	533
Dalmeny Beauty	448	744	389	527
Vick's Extra Early	431	625	515	523
Irish Cobbler	265	573	437	458

Irish Cobbler is of good quality and in a short season is of decidedly superior quality to any of the other varieties, but is of so low yield and so irregular in shape that it can scarcely be recommended as a commercially profitable variety to grow. Moneymaker produces larger potatoes than any other variety. They are white, long, and have medium eyes, but are of poor quality. Dreer's Standard, Morgan Seedling, and Rawlings Kidney (Ashleaf Kidney) are of good shape and fair quality.

An experiment has been conducted for the past two years on depth of seeding with the following results:—

Depth of Seeding.	1912	1913	2-year average.
	Bush.	Bush.	Bush.
4 inches deep, 4 inches subsoiling	789	498	634
6 inches deep	775	526	650
4 inches deep	659	540	599
2 inches deep	465	531	498

Two plots of potatoes otherwise alike in every respect were cultivated differently in 1912 and 1913. One plot was hilled in June whereas the other was kept level. The potatoes from the plot treated to level cultivation were slightly more sunburned than those from the plot that was hilled. If digging is not done early there is more danger from a few of the potatoes in the level plot being frozen by the early fall frosts.

Variety.	1912	1913	2-year average.
	Bush.	Bush.	Bush.
Hilled	620	567	593
Unhilled	645	527	586

Following are the results:

A similar experiment in 1910 showed a difference of 50 bushels per acre in favour of level cultivation.

Potatoes planted at different distances apart gave the following results:—

Distance apart.	1912	1913	2-year average.
Seed 12 inches, rows 30 inches	657	505	581
" 14 " " 33 "	609	528	618
" 15 " " 36 "	570	394	482

EXPERIMENTAL STATION, SCOTT, SASKATCHEWAN.

REPORT OF THE SUPERINTENDENT, R. E. EVEREST, B.S.A.

The weather conditions of the past year favoured successful work in gardening. The season of 1913 opened early, growth was uniform and continued well into late summer. The rainfall was not heavy but was such as to encourage a fair growth on well tilled land.

This moderate growth in an open season permitted classes of vegetables to mature here which had in previous years failed.

Tomatoes were ripened, cucumbers grew in the open, celery came to the table stage, and corn was practically in use.

Horticulture, especially in fruit and ornamental tree growing, is persistently arranged for, and a considerable showing is already made on the grounds in this direction.

Improvement was made to the entrance of the Station in the autumn by opening up a main drive through the lawn, changing the gateway to the corner adjoining the town and, on this portion of the road line in front of the lawn and residence, 700 feet of lawn fence was erected, replacing the plain fence previously used.

This change improves the approach to the Farm considerably. Work in horticulture has not received very much thought or effort heretofore in this young grain-growing section of the province. The clerical and outside work of experimenting requires knowledge and experience to change the present prevailing custom, and as these are obtained, marked advance in this line of work will be seen.

VEGETABLES.

POTATOES—TEST OF VARIETIES.

Nineteen varieties of potatoes were planted on the 20th of May in drills 30 inches apart and the sets at about 12 inches apart in the row. There were four rows of each variety, each row 66 feet long. Frequent cultivation was given during the season, and a fair growth of top was seen. The potatoes were taken up on the 30th of September. The crop was not large in total yield, but in quality and size of tuber the result was favourable.

POTATOES—Test of Varieties.

	Name of Variety	Date of planting.	Date of lifting.	Size.	Yield per acre.		Form and Colour.
					Bush.	Lb.	
1	Table Talk	May 20	Sept. 30	Medium	283	48	Oval, white.
2	Wee McGregor	" 20	" 30	Large	255	12	Long, white.
3	Dreer's Standard	" 20	" 30	Medium	242	33	Round, white.
4	Rawlings' Kidney. (Ashleaf Kidney)	" 20	" 30	"	240	54	Kidney-shaped, white.
5	Morgan Seedling	" 20	" 30	Large	237	3	Long, white.
6	Carman No. 1	" 20	" 30	Medium	226	3	Round, white.
7	Dalmeny Beauty	" 20	" 30	Large	218	54	Oval, white.
8	Gold Coin	" 20	" 30	Medium	216	28	Oval, white.
9	Money Maker	" 20	" 30	Small	209		Long, white.
10	Rochester Rose	" 20	" 30	Large	202	24	Long, red.
11	Empire State	" 20	" 30	Medium	188	39	Long, white.
12	Everett	" 20	" 30	Large	179	58	Long, pink.
13	Irish Cobbler	" 20	" 30	Medium	175	27	Round, deep eyes, white
14	Late Puritan	" 20	" 30	Large	172	9	Oval, white.
15	Vick's Extra Early	" 20	" 30	Medium	148	30	Long, pink and white.
16	Factor	" 20	" 30	"	133		Oval, white.
17	Reeves' Rose	" 20	" 20	"	132		" red.
18	Hard to Beat	" 20	" 30	Small	130	54	" white.
19	American Wonder	" 20	" 30	"	80	18	Round, white, pink eyes

Seven varieties of potatoes grown on a different area basis were also tested and resulted as follows.

POTATOES.—Test of Varieties.

	Name of Variety.	Number of rows grown.	Date of planting.	Date of lifting.	Size.	Yield per acre.		Form and Colour.
						Bus.	Lb.	
1	Prince Albany	1 row, 66 ft. long	May 20	Sept. 30	Large	356	24	Oval, white.
2	New Queen	2 rows, 66 "	" 20	" 30	Medium	242		Oval, red.
3	Early Norther	" 66 "	" 20	" 30 "		228	48	Round, red.
4	Houlton Rose	" 66 "	" 20	" 30	Large	209		Long, red.
5	Early Hebron	" 66 "	" 20	" 30	"	193	36	Round, red.
6	Early Ohio, 0-1693	1 row, 66 "	" 20	" 30	Small	107	48	Round, pink.
7	Bermuda Early 0-1688	2 rows, 66 "	" 20	" 30	Large	39	36	Round, red.

BEANS.

Sown in the garden May 19. One row 30 feet long of each, and rows 30 inches apart.

Variety.	In use.	Remarks.
Wardwell's Kidney Wax	July 29	Good crop.
Stringless Green Pod	Aug. 1	"
Refugee or 1000 to 1	July 25	"
Bountiful	" 13	"
Early Refugee	Aug. 5	"
Icemcy's Rustless Wax	" 5	"
Valentine	" 5	"

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BEETS.

Sown May 28; pulled September 22. One row 30 feet long of each, and rows 30 inches apart.

Variety.	In use.	Yield per acre.
		Bushels.
Early Blood Red Turnip	July 15	513¾
Egyptian Dark Red Turnip	" 20	513¾
Meteor	July 20	503½
Eclipse	Aug. 1	474½
Black Red Ball	" 1	310
Ruby Dulcet	July 20	310

BRUSSELS SPROUTS.

Sown in hotbed April 9; transplanted into garden May 27; pulled September 25. Average weight per head (trimmed), 3 pounds.

CABBAGE.

Sown in hotbed April 7; set out in garden May 26; taken up September 23.

Variety.	In use.	Average weight in pounds.	Remarks.
Copenhagen Market, (B)	Aug. 8	6¾	Large, solid.
Flat Swedish	" 10	6½	"
Copenhagen Market, (H)	" 8	5¾	"
Improved Amager Danish Ballhead	Sept. 1	5	"
Danish Summer Ballhead	Aug. 28	4¼	Medium.
Extra Amager Danish Ballhead	Sept. 6	4¼	"
Large late-flat Drumhead	Aug. 25	4	"
Lubeck	" "	4	"
Winningstadt	Sept. 5	3	Small, solid.
Fottler's Improved Brunswick	Aug. 16	3½	Medium.
Magdeburg	Sept. 5	3	Small, solid.
Early Jersey Wakefield	Aug. 1	2	"
Early Paris Market	" 1	2¼	"
Extra Early Midsummer Savoy	" 1	2¼	"
Small Erfurt	" 10	2¼	"

CAULIFLOWER.

Sown in hotbed April 7; set out in garden May 27; taken up August 28.

Variety.	In use.	Average weight in pounds.	Remarks.
Extra Selected Early Dwarf Erfurt	July 25	2⅝	Good.
Danish Giant or Dry Weather	Aug. 5	2¼	"
Early Snowball	July 20	2	"

CARROTS.

Sown May 19; pulled September 23. One row 30 feet long of each; rows 30 inches apart.

Variety.	In use.	Remarks.
Half Long Chantenay	Aug. 1	Medium crop.
French Horn	" 1	"
Improved Nantes	" 1	"

CUCUMBERS.

Sown in garden May 22; three hills of each variety, hills 6 feet apart each way.

Variety.	In use.	Remarks.
Peerless White Spine	Aug. 20	Small yield, but good quality.
Prize Pickling	" 20	"
Cool and Crisp	" 20	"
Extra Early Russian	" 20	"
Giant Pera	" 20	"

CELERY.

Planted in hotbed April 7; transplanted in open June 5, in trenches 12 inches deep. This soil was drawn in as the celery grew. During the dry part of the season the plants were given water. One row 15 feet long of each variety.

Variety.	Remarks.
Noll's Magnificent	Small crop.
French Success	Failed to germinate.
Evans' Triumph	Small crop.
White Plume	"
Rose Ribbed Paris	Failed to germinate.
Paris Golden Yellow	"
Giant Pascal	"

TABLE CORN.

Planted May 22; five rows each 30 feet long of each variety; rows 3 feet apart.

Variety.	Remarks.
Squaw	Almost ready for use when destroyed by frost, September 2.
Henderson Metropolitan	
Fordhook Early	
Golden Bantan	
Early Malcolm	
Early Iowa	
Early Evergreen	
Perkins' Early	
Extra Early Adams	
Carter's Improved Sweet	

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ONIONS.

Sown in garden April 15; taken up September 24. This crop was attacked by cut-worms in early part of season, causing a poor stand. One row 36 feet long of each variety, and rows 15 inches apart.

Variety.	Bushels per acre.	Remarks.
Red Early Flat	263	Good crop.
Red Australian Brown	245	"
Large Red Wethersfield	182	Medium crop.
Danver's Yellow Globe	154	"
White Pearl	154	"
Extra Early Red	144	"
Early Barletta	106	Poor crop.
Salzer's Wethersfield	94	"
White Queen	72	"
Johnson's-Dark Red Beauty	27	"

PARSNIPS.

Sown in garden May 4; pulled September 22. One row 30 feet long.

Variety.	In Use.	Bushels per acre.	Remarks.
Hollow Crown	Aug. 15	155	Medium crop.

PARSLEY.

Double Curled, sown in garden May 19; in use July 20; good crop. One row 30 feet long.

GARDEN PEAS.

Sown in garden May 16. One row 30 feet long of each variety; rows 30 inches apart.

Variety.	In use.	Remarks.
Nott's New Perfection	July 29	Good crop.
Gradus	Aug. 2	"
American Wonder	July 18	"
Sutton's Excelsior	" 29	"
Heroine	Aug. 5	"
Juno	" 5	"
Premium Gem	July 25	"
McLean's Advancer	Aug. 5	"
Stratagem	" 4	"
Thomas Laxton	July 25	"
Telephone	Aug. 7	"
Gregory's Surprise	July 20	"

RADISHES.

Sown in garden May 19; in use June 25. One row of each variety 30 feet long and 15 inches apart.

Variety.	Remarks.
Early Scarlet White Tipped	Medium crop.
Forcing Turnip Scarlet	"

LETTUCE.

Sown in garden May 18; in use July 12. One row 30 feet long of each variety; rows 15 inches apart.

Variety.	Remarks.
Dark Green Capucine	Poor crop.
Unrivalled Summer	Medium crop.
Red Edged Victoria	Good crop
Rousseau Blond Winter	"
Grand Rapids	"
Improved Hanson	"
Black Seeded Simpson	"
Iceberg	"
Crisp as Ice	"
All Heart	"
Giant Crystal Head	"

SALSIFY.

Sown in garden May 9; ready for use September 1. Variety, Long White. Good crop. One row 30 feet long.

TURNIPS.

Sown in garden May 19; pulled September 20. One row 30 feet long of each variety, rows 15 inches apart.

Variety.	In use.	Bushels per acre.	Remarks.
Extra Early White Milan	July 24	707	Good crop.
Early White Flat Strapped Leaf	" 24	989	"
D. F. Favorite	Aug. 15	648?	"

RHUBARB.

Rhubarb was in use from May 15 to September 1, giving a good crop, this being the second crop since setting out.

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SQUASH.

Planted in garden May 22, three hills of each variety; hills 9 feet apart each way.

Variety.	Heaviest weight.	Total weight.	Pulled.	Remarks.
	Lb.	Lb.		
Long Vegetable Marrow	15	67¾	Sept. 15	Medium crop.
White Vegetable Marrow	10½	51	" 15	"
Long White Bush Marrow	9	58	" 15	"
Delicious	8	8	" 15	Poor crop.
Golden Hubbard	7	28	" 15	Small crop.
Summer Crookneck	2	5	" 15	"
Custard Marrow				Did not mature.
White Bush Scallop				"
Delicata				"
Carter's Trailing				"

THE FLOWER GARDEN.

Nearly all the flowers gave an abundance of bloom, the most interesting being the tulips and pansies.

The tulips beginning to bloom May 20, made a very brilliant display, and continued until the pansies, sweet williams, and chrysanthemums were in bloom.

The pansies, stocks, phlox Drummondii, and verbenas continued their bloom until the 14th of October, making the border very attractive during the entire season.

ANNUALS.

Variety.	Sown in hotbed.	Transplanted.	In Bloom. From	In Bloom. To
Asters	April 7	May 30	Aug. 1	Sept. 24
Antirrhinums	" 8	June 4	" 5	" 10
Alonsoa	" 10	May 30	" 6	" 2
Balsam	" 9	June 9	" 5	" 2
Coxcomb	" 8	May 29	July 20	" 2
Coreopss	" 9	June 16	" 8	" 10
Candytuift	" 9	May 28	June 20	Oct. 1
Cosmos	" 10	" 28	July 12	Sept. 10
Dianthus	" 9	" 28	" 5	" 15
Gaillardia	" 10	" 28	" 12	" 15
Godetia	" 10	" 29	" 8	" 15
Linaria	" 10	" 29	June 18	Aug. 15
Marvel of Peru	" 9	" 28	Aug. 6	Sept. 2
Marigold	" 9	" 28	July 20	" 23
Mignonette	" 10	" 27	" 7	Aug. 20
Nemesia	" 8	" 29	" 8	Sept. 10
Petunia	" 8	" 30	" 8	" 2
Phlox Drummondii	" 9	June 4	Aug. 1	" 14
Pansies	" 9	May 29	July 10	Oct. 14
Portulaca	" 10	" 28	June 20	Sept. 2
Poppy	" 11	June 4	July 9	" 10
Salpiglossis	" 9	" 4	Aug. 1	" 2
Sweet Sultan	" 10	May 27	July 16	" 15
Stocks	" 10	" 27	July 8	Oct. 14
Scabiosa	" 11	June 21	July 27	Sept. 2
Verbena	" 8	May 28	" 10	Oct. 6
Viola	" 10	June 2	" 8	" 14
Zinnia	" 11	May 28	" 7	Sept. 2

FLOWERS.—Seed sown in open bed.—Annuals.

Variety.	Date sown.	In Bloom.	
		From	To
Sweet Peas	April 19	July 10	Sept. 24.
Lupines	May 2	June 25	" 15
Malope	" 20	Aug. 27	" 24.
Larkspur	" 20	" 18	Oct. 1.
Nasturtium	" 20	" 20	Sept. 24.

FRUITS.

Small quantities of fruit matured of strawberries, raspberries, and currants.

The strawberry plants, which the previous year multiplied, made a fair show in the row, and future success is somewhat assured from this evidence that we can produce our own plants for renewal and extending purposes. Currants, to the number of twenty varieties, were received from the Central Farm, and set out in the small-fruit plantation.

Considerable extension work was also undertaken with apple stock. Four hundred and seventy-four cross-bred apple trees were received and given places in the orchard, and over 900 seedlings were placed in the nursery row. The question of variety and hardy individual specimens is an important consideration in this work, and by the different lines that are undertaken, a strong endeavour is being made to solve the apple production problem.

TREES AND SHRUBS.

Ornamental trees and shrubs make a very favourable showing. The growth and increase in height is not rapid, but many varieties withstand the severity of winter and continue to make a steady growth. For replacing individuals which had succumbed, and for additional planting, 557 trees and shrubs were received from the Farm at Ottawa and were set out in the arboretum, lawn, hedge, or nursery.

In June several specimens were noted in bloom; the following were the number:—*Syringa Josikaea, Syringa villosa, Syringa vulgaris Congo, Cornus alba sibirica, Potentilla fruticosa, Caragana tragacanthoides, Spiræa Van Houttei, Cotoneaster tomentosa, Caragana pygmaea, Euonymus linearis, and Lonicera Albertii.*

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Magnus Apple Tree in Bloom on Dry Land Orchard, Lethbridge.

Silvia Apple, Dry Land, May 25, 1913. Experimental Station, Lethbridge.

EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

CHARACTER OF SEASON.

The season has proved itself to be a favourable one for horticultural operations. The winter of 1912-13 was such that the trees and shrubs came through with slight injury and appeared, with few exceptions, to be in a strong, vigorous condition in the spring. The dry weather during the latter part of May and early June, which was so disastrous to grain crops in the immediate vicinity of Lethbridge, was of benefit rather than otherwise in the horticultural work, in that the mean temperature during this period was higher than it otherwise would have been had we had our usual rainy period at this season. The last frost was on May 12, when 29·2° F. were registered. The first frost in the fall occurred on September 12, when the mercury dropped to 32·0°, although previous to this, slight injury to the more tender foliage could be noticed, more particularly about September 6 when the temperature was 34·1°.

CULTURE WITH AND WITHOUT IRRIGATION.

Although we have two Farms, one irrigated and the other non-irrigated, so far the greater part of the work in horticulture has been carried on under irrigation. We have, however, all of the varieties of apples and currants, red, white, and black, growing on the non-irrigated Farm that are on the irrigated, also some of the varieties of raspberries and plums. Notwithstanding that the results as here given were obtained on irrigated land, unless otherwise specified, they should nevertheless be of interest and value to the dry-land farmer. Although it is a fact that it will not always be possible to get the same yields without irrigation, still they can be approached if careful attention is given to cultivation to conserve the moisture. When a garden is not to be irrigated, the plants should be placed at a greater distance apart. In the case of annuals they should be planted on land specially prepared the season before with the view of having a good supply of moisture in the subsoil. Although the importance of having as much summer-fallowed land prepared as possible for grain crops is now generally realized by most farmers in the drier localities in the southern part of the province, the fact that it is just as important to have summer fallow on which to plant the garden has not yet been brought home to the average man. The land on which a garden is to be planted on a dry-land homestead should not only have been carefully summer-fallowed the season previous but should contain a liberal amount of barnyard manure, well incorporated therein. This can best be done by applying well-rotted manure just before it is ploughed for summer-fallow. Manure worked in in this way increases the ability of the soil to retain moisture, besides improving its tilth. Never apply manure on non-irrigated land the same season that the crop is planted. Every dry-land farmer should set aside for the kitchen garden just twice the amount of land that he intends to put in in any season. One-half should be manured as mentioned above. In May or early June it should be ploughed at least 8 inches deep. During

the rest of the season sufficient cultivation should be given to prevent the growth of all vegetation. The land should not be ploughed the following spring but be given sufficient surface cultivation to prepare a good seed-bed. The chances of success are greatly enhanced by having a shelter belt of trees planted on the windward side (which is, of course, not necessarily the north side) for, besides protecting the land in a great measure from the effects of the drying winds, it is also almost certain to collect a bank of snow, which is a great advantage. If conscientious cultivation is given so that a loose mulch is maintained at all times on the surface, it is surprising how well vegetables can be made to yield in even quite dry seasons. It is needless to point out the advantage of making the rows continuous and wide enough apart so that a horse cultivator can be used, which reduces the amount of hand hoeing that would otherwise be necessary.

LETHBRIDGE.

PART I.—EXPERIMENTS WITHOUT IRRIGATION OR "DRY FARM".

POTATOES.

Twenty-five varieties were tested. They were planted May 21 on summer-fallow and were dug October 6. One-hundredth of an acre was planted in each case.

VARIETIES OF POTATOES (non-Irrigated).

Variety.	Yield per acre. Marketable.		Yield per acre. Unmarketable.		Total yield per acre.	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Dalmeny Beauty	244	48	39	3	283	52
Table Talk	223	59	57	17	281	16
Carman No. 1	221	22	32	33	253	55
Late Puritan	223	19	26	2	249	21
Rawlings Kidney (Ashleaf Kidney)	214	12	33	51	248	3
Hebron	199	14	44	55	244	9
Houlton Rose	207	41	32	33	240	14
Gold Coin	210	19	28	38	238	57
Empire State	209	38	28	38	238	17
Everett	197	55	39	4	236	59
Rochester Rose	197	55	33	12	231	7
Green Mountain	194	40	35	9	229	49
Early Norther	208	22	19	31	227	53
Irish Cobbler	195	19	31	15	226	34
American Wonder	205	44	20	50	226	34
Money Maker	197	55	24	44	222	39
Factor	192	5	28	38	220	43
Wee McGregor	188	48	31	15	220	3
Reeves' Rose	177	45	37	45	215	30
Vick's Extra Early	187	31	26	2	213	33
Hard to Beat	187	31	26	2	213	33
Dreer's Standard	188	48	19	31	208	19
Morgan Seedling	175	47	30	36	206	23
New Queen	177	44	28		205	44
Early Ohio	152	21	27	20	179	41

RED CURRANTS (Non-Irrigated).—Test of Varieties.—Three plants of each variety were planted in 1908, 6 feet apart each way.

Variety.	Date of first picking.	Date of last picking.	Actual yield from 3 bushes.
			Pints.
Raby Castle	July 8	July 31	16½
Red English	" 9	" 31	16
Red Grape	" 14	" 31	14½
Large Red	" 16	" 31	12
New Red Dutch	" 11	" 31	11
Greenfield	" 12	" 31	7
Victoria Red	" 8	" 31	6½
Moore's Seedling	" 16	" 31	6
La Condé	" 12	" 31	5½

LETHBRIDGE.

White Currants (Non-irrigated).—Test of Varieties.—Three plants of each variety were planted in 1908, 6 feet apart each way.

Variety.	Date of first picking.	Date of last picking.	Actual yield from 3 bushes.
			Pints.
White Kaiser	July 16	Aug. 1	10
Verrieres White	" 17	" 1	10
Large White	" 14	" 1	8
Wentworth Leviathan	" 14	July 19	7
White Cherry	" 14	" 19	6
White Brandenburg	" 15	" 19	3
Climax	" 14	Aug. 1	2¼
White Pearl	" 15	July 19	2
White Grape	" 14	" 19	2

Black Currants (Non-Irrigated).—Test of Varieties.—Three plants of each variety were planted in 1908, 6 feet apart each way.

Variety.	Date of first picking.	Date of last picking.	Actual yield from 3 bushes.
			Pints.
Bang Up	July 14	Aug. 1	12½
Beauty	" 10	" 1	8¾
Ethel	" 10	" 1	8¾
Ontario	" 12	July 18	8
Saunders	" 11	Aug. 1	7¼
Climax	" 8	" 1	6¼
Magnus	" 10	" 1	5½
Merveille de la Gironde	" 14	" 1	4¾
Eagle	" 12	July 17	4
Topsy	" 12	Aug. 1	3¾
Winona	" 8	July 18	3
Monarch	" 9	" 18	2
Norton	" 14	" 18	2
Kerry	" 14	" 18	1

RASPBERRIES.

Three varieties are under test. The quality and flavour was excellent, though on account of the dry season the yield of fruit was light. This plantation is some distance from the houses and so much of the fruit was taken by visitors that we are not reporting the amount actually picked, as we feel it would be misleading.

Test of Varieties.—(Non-Irrigated).

Variety.	Date of first picking.	Date of last picking.
Sunbeam	July 15	July 31.
Early King	" 17	" 31.
Sarah	" 20	" 31.

Lethbridge.

APPLES.

There are four or more trees of the following varieties set out in the non-irrigated orchard, and in the table is given the amount of fruit obtained from the most productive tree in each case.

CROSS-BRED APPLES (Non-Irrigated).

Variety.	Date of first picking.	Total yield.
		Lb.
Jewel	Sept. 2	56
Robin	" 3	54
Magnus	Aug. 29	47
Aurora	Sept. 3	38
Norman	" 2	31
Pioneer	Aug. 25	30
Carlton	Sept. 12	21
Silvia	Aug. 23	16
Bow	Sept. 12	3

PART II.—EXPERIMENTS ON IRRIGATED LAND.

POTATOES.—TEST OF VARIETIES.

Twenty-five varieties were planted May 23 on land on which grain had been grown the previous season. Manure was applied after the grain was harvested and the land was fall ploughed. The sets were placed from 12 to 14 inches apart in the row and the rows were 30 inches apart. The crop was irrigated three times. They were dug October 1.

VARIETIES OF POTATOES (Irrigated).

Variety.	Yield per acre Marketable.	Yield per acre Unmarketable.	Total yield per acre in 1913.
	Bush. Lb.	Bush. Lb.	Bush. Lb.
Green Mountain	625 00	30 00	655 00
Vick's Extra Early	525 00	40 00	565 00
Irish Cobbler	483 20	45 00	528 20
Early Norther	500 00	21 40	521 40
Hard to Beat	483 20	30 00	513 20
New Queen	450 20	58 20	505 40
Rochester Rose	466 40	25 00	491 40
Table Talk	441 40	42 30	484 10
Everett	419 10	33 20	442 30
Empire State	438 20	30 00	468 20
Houlton Rose	421 40	18 20	440 00
Morgan Seedling	413 20	23 20	436 40
Ohio (Perry)	405 00	28 20	433 20
Early Hebron	400 00	30 00	430 00
Rawlings Kidney (Ashleaf Kidney)	383 20	18 20	401 40
Wee McGregor	358 20	33 20	391 40
Dalmeny Beauty	348 20	43 20	391 40
Dreer's Standard	361 40	21 40	383 20
Money Maker	355 00	16 40	371 40
Reeves' Rose	351 40	33 20	385 00
Gold Coin	341 40	23 20	365 20
American Wonder	336 40	20 50	357 30
Carman No 1	333 20	23 20	356 40
Late Puritan	325 00	20 00	345 00
Factor	293 30	25 00	318 30

THE VEGETABLE GARDEN—IRRIGATED.

All kinds of vegetables did well during the season just past. On April 12 the different varieties of lettuce, radish, parsley, turnips, onions, peas, and spinach were planted. The more tender kinds, or those which require a longer season, were started in hotbeds. Among these were tomatoes, the seed of which was sown March 31. Cabbage, cauliflower, and celery were sown in frames early in April. A few pots each of a number of varieties of squash were also planted in the hotbeds in the early part of April to compare the results from the same seed sown in the open on June 11, after danger of frost was past.

LETHBRIDGE.

LETTUCE.

Variety.	Date ready for use.	Date of last used before going to seed.
Grand Rapids	June 12	July 22
All Heart	" 12	" 21
Crisp as Ice	" 12	" 5
Dark Green Capucine	" 12	" 24
Roussean Blond	" 13	" 14
Red Edged Victoria	" 13	" 19
Giant Crystal Head	" 14	" 15
Unrivalled Summer	" 17	" 4
Black Seeded Simpson	" 18	" 6

RADISH.

Variety.	Date of First picking.	Date of Last picking.	Yield. Lb.	oz.
Forcing Turnip Scarlet	May 23	June 19	2	8
Early Scarlet White Tipped	May 23	" 16	2	00

In each case the yield was taken from one row, 15 feet long.

BEANS.

DWARF KIDNEY.—Seven varieties of beans were tested.

Variety.	Date when ready for use.	Date of last picking.
Wardwell's Kidney Wax	July 29	Aug. 27
Bountiful	" 29	" 28
Early Refugee	Aug. 2	Sept. 3
Stringless Green Pod	" 3	" 1
Valentine	" 3	" 1
Kenney's Rustless Wax	" 6	" 4
Refugee or 1000 to 1	" 8	" 6

CORN.

Ten varieties of corn were tested.

Variety.	Date when ready for use.	Date when last fit for table use.
Squaw	Aug. 2	Aug. 28
Early Malcolm	" 13	" 30
Fordhook Early	" 15	" 28
Carter's Improved	" 16	Sept. 2
Early Iowa	" 18	Aug. 30
Golden Bantam	" 21	Sept. 19
Early Adams	" 22	" 2
Perkin's Early	" 23	" 8
Early Evergreen	Sept. 2	" 10
Henderson's Metropolitan	"	" 10

LETHBRIDGE.

PARSLEY.

Variety.	Ready for use.	Remarks.
Double Curled	June 23	Very large and thick

TURNIPS.

Two varieties were tested.

Variety.	Date first pulled.	Date last pulled.
Early White Strap Leaved	June 21	July 9.
Extra Early White Milan	" 21	" 9.

ONIONS.

Ten varieties of onions were tested. The yield in each case was taken from one row 15 feet long.

Variety.	Ready for use.	Date of ripening.	Yield.
			Lb. Oz.
Danver's Yellow Globe	July 27	Oct. 9	27
Large Red Wethersfield	Aug. 2	" 15	26 00
Johnson's Dark Red Beauty	" 5	" 15	25 00
Early Red Flat	July 23	" 5	25 00
Extra Early Red	" 20	Sept. 29	23 00
Salzer's Wethersfield	Aug. 8	Oct. 15	14 00
New Australian Brown	July 26	" 9	10 00
White Pearl	" 20	Sept. 29	9 8
Early Barletta	" 18	" 29	8 00
White Queen	" 18	" 29	6 00

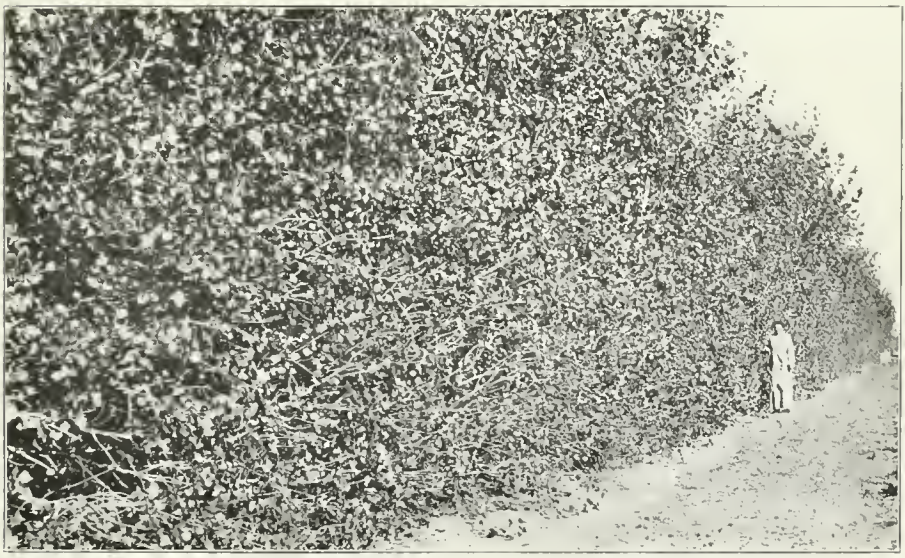
PEAS.

Twelve varieties of peas were tested. The yield was computed from one row 30 feet long.

Variety.	Date of first picking.	Date of last picking.	Yield.
			Lb.
Stratagem	June 26	Aug. 1	12
Thomas Laxton	" 20	July 19	10
Telephone	" 25	" 30	9
Sutton's Excelsior	" 27	Aug. 2	9
Gradus	" 28	" 3	9
Nott's New Perfection	July 1	" 5	8
Juno	June 26	" 1	8
Premium Gem	" 27	July 30	7
Heroine	" 27	" 30	7
McLean's Advancer	" 26	" 28	6
American Wonder	" 21	" 21	6
Gregory's Surprise	" 19	" 16	5

LETHBRIDGE.

Dry Land Orchard, May 26, 1913, Experimental Station, Lethbridge.



A Windbreak of Alberta Cottonwoods 5 Years Old.

SPINACH.

Variety.	Date first used.	Date last used.
Victoria	June 1	June 17

SALSIFY.

One variety tested, and yield taken from one row 30 feet long.

Variety.	Date ready for use.	Yield.
Long White	Aug. 1	16

PARSNIP.

One variety was tested and the yield was taken from six rows, each 30 feet long.

Variety.	Date ready for use.	Yield.
		Lb.
Hollow Crown	July 26	450

CARROTS.

Three varieties were tested, the yield being computed in each case from one row 30 feet long.

Variety.	Date first ready for use.	Yield.
		Lb.
Half Long Chantenay	June 24	110
Improved Nantes	July 5	65
French Horn	" 8	55

LETHBRIDGE.

BEETS.

Seven varieties of beets were tested and the yield was taken from one row 30 feet long.

Variety.	Date first ready for use.	Yield.
		Lb.
Early Blood Red Turnip	June 29	210
Eclipse Early Red Turnip	" 27	204
Egyptian Dark Red Turnip	July 29	180
Eclipse	" 12	114
Ruby Dulcet	" 2	108
Meteor	" 6	106
Black Red Ball	" 6	51

SQUASH.

Test with seed sown in open.

Variety.	Date ready for use.	Weight of matured crop.	Total yield.
		Lb.	Lb.
Long White Bush Marrow	Aug. 2	56	82
Long Vegetable Marrow	Aug. 9	—	46
Delicata	Aug. 5	—	18
Golden Hubbard	Aug. 14	—	16
Delicious	Aug. 16	—	8
Custard White Bush Scallop Marrow	Aug. 7	6	10
Summer Crookneck	Aug. 19	—	2

CABBAGE.

Sixteen varieties of cabbage were tested, the yield in each case being taken from two rows each 30 feet long.

Variety.	Date ready for use.	Yield.	Remarks.
		Lb.	
Large Late Flat Drumhead	Sept. 2	392	Late.
Extra Amager Danish Ballhead	Aug. 29	387	Late.
Flat Swedish	" 18	382	Medium.
Lubeck	" 8	368	Early.
Magdeburg	" 21	365	Medium.
Copenhagen Market	" 4	352	Early.
Improved Amager Danish Ballhead	" 25	327	Late.
Winningstadt	" 22	326	Late.
Potters' Improved Brunswick or Short Stem	" 7	325	Early.
Danish Summer Ballhead	" 20	323	Medium.
Danish Delicatesse	" 7	265	Early.
Red Danish Stonehead	" 16	201	Med um.
Extra Early Midsummer Savoy	" 3	183	Early.
Small Erfurt	" 4	141	Early.
Early Jersey Wakefield	July 29	139	Extra early.
Early Paris Market	" 29	136	Extra early.

CAULIFLOWER.

Four varieties were tested. The yield was computed from two rows, each 30 feet long.

Variety.	Date ready for use.	Yield	Remarks.
		Lb.	
Danish Giant	Aug. 5	59	Medium.
Early Snowball	July 29	31	Early.
Early Dwarf Erfurt	Aug. 2	30	Early.

TOMATOES.

Ten varieties of tomatoes were tested. In each case the yield was taken from five plants.

Variety.	Date of first picking.	Date of last picking.	Yield.			
			Ripe fruit.		Green fruit.	
			lb.	oz.	lb.	oz.
Bonny Best	Aug. 7	Sept. 17	7	8	25	0
Sparks Earliana 12-23 C.E.F.	" 21	" 17	5	1	23	1
Rennie's Earliest	" 10	" 17	8	0	16	0
Alacrity 2-24-10 C.E.F.	" 18	" 17	4	4	15	0
Chalk's Early Jewel	" 5	" 17	10	13	14	0
I. X. L.	" 18	" 17	4	8	13	0
North Adirondack Earliana	" 21	" 17	4	9	11	8
Alacrity 2-24-9 C. E. F.	" 23	" 17	3	2	11	8
Sparks Earliana (Sunnybrook strain)	" 21	" 17	1	2	7	11
Florida Special	" 26	" 17	1	2	7	11

CUCUMBERS.

Five varieties were tested. The yield in each case was taken from three hills. Seed of each variety was started in the cold frames and then the plants were set out. We also sowed seed of each variety in the open, and following are the results:—

Variety.	Date Ready for Use.		Yield from plants started in frames.		Yield from seed sown in open.	
	Plants started in frames.	Seed sown in open.				
			lb.	oz.	lb.	oz.
Prize Pickling	Aug. 3	Aug. 27	48	0	6	8
Peerless or White Spine	" 3	Sept. 14	45	8	5	8
Extra Early Russian	" 5	" 18	15	0	3	8
Giant Pera	" 14	" 10	13	0	6	8
Cool and Crisp	" 8	" 3	9	0	3	0

SQUASH.

Eight varieties of squash were started in the cold frames and then transplanted in the garden after danger of frost was past. Seven varieties of squash were sown in the garden without having been first started in the frames. The following yields

were computed in each case from three hills of each variety. Test with plants started in cold frames.

Variety.	Date ready for use.	Weight of matured crop.	Total yield.
		lb.	lb.
Long Vegetable Marrow	July 28	98	224
Carter's Trailing White Vegetable Marrow	Aug. 2	82	144
Delicious	Aug. 10	56	120
Long White Bush Marrow	July 26	47	73
Golden Hubbard	Aug. 21	24	67
Delicata	July 22	15	48
Summer Crookneck	Aug. 14	23	30
Custard White Bush Scallop Marrow	Aug. 2	10	14

CELERY.

Seven varieties were tested. The yield was taken from one row 15 feet in length. All put in root cellar on October 7.

Variety.	Date ready for use.	Yield.	Remarks.
		lb.	
Giant Pascal	Aug. 12	44	Good keeping variety.
Evans' Triumph	" 20	42	Good keeping variety.
White Plume	" 19	40	Good for early use.
Noll's Magnificent	" 17	39	
Paris Golden Yellow	" 20	36	
French Success	" 24	34	Good keeping variety.
Rose Ribbed Paris	" 20	32	

STRAWBERRIES.—Test of Varieties.

Twenty-five varieties of strawberries are being tested. The bed was set out the previous season. There are two rows 15 feet long of each variety. The rows are 3½ feet apart.

STRAWBERRIES.—(Irrigated.)

Variety.	Date first ripe fruit.	Date last picking	Actual yield.
			lb. oz.
August Luther	June 28	July 28	10 10
Senator Dunlap	July 4	" 28	7 11
Pocomoke	" 5	" 28	6 6
Bismarck	" 5	" 28	5 10
Williams	" 9	" 28	5 0
Splendid	" 6	" 28	4 11
Fountain	" 5	" 28	4 6
Wm. Belt	" 10	" 28	4 1
Tennessee Prolific	" 9	" 28	3 15
Glen Mary	" 10	" 28	3 12
Marie	" 10	" 28	3 12
Clyde	" 5	" 17	3 8
Sample	" 10	" 28	3 2
3 W's	" 4	" 28	3 1
Aroma	" 10	" 28	2 13
Ab ngton	" 6	" 28	2 12
Ridgeway	" 5	" 28	2 10
Van Deman	" 4	" 28	2 8
Chapman	" 4	" 28	1 14
Gandy	" 5	" 28	1 13
Minute Man	" 10	" 28	1 10
Nellie, P.	" 14	" 28	1 6
Brandywine	" 11	" 28	1 3
Buster	" 9	" 28	0 13
Irene	" 11	" 17	0 11

LETHBRIDGE.

RASPBERRIES.

Nine varieties are being tested. There are two rows of each variety 30 feet long, with the rows 7 feet apart The stand is not perfect in all cases so the yields are not altogether comparable, but are of sufficient interest to warrant reporting.

RASPBERRIES (Irrigated)—Test of varieties.

Variety.	Date of first picking.	Date of last picking.	Actual yield.	Size of fruit.
			Pints.	
Marlboro	July 9	Aug. 9	60½	Large.
Herbert	" 14	" 15	42	Large.
Loudon	" 16	" 16	40½	Large.
Early King	" 10	" 11	40	Medium.
Cuthbert	" 15	" 16	30½	Medium.
Ruby	" 9	" 15	29¾	Medium.
Sunbeam	" 10	" 16	26¾	Medium.
Sarah	" 18	" 16	18	Small.
Golden Queen	" 15	" 16	13	Small.

RED CURRANTS (Irrigated)—Test of varieties.

Three plants of each variety were planted in 1908, 6 feet apart each way.

Variety.	Date of first ripe fruit.	Date of last picking.	Actual yield from 3 bushes.	Size of berry.
			Pints.	
New Red Dutch	July 9	July 31	31	Large.
Large Red	" 9	" 31	26½	Medium.
Moore's Seedling	" 12	" 31	24	Large.
Red English	" 8	" 31	21	Medium.
Red Grape	" 9	" 31	20½	Large.
Victoria Red	" 10	" 31	20½	Medium.
Red Dutch	" 12	" 31	18	Medium.
Cumberland	" 12	" 23	16	Medium.
Pomona	" 11	" 23	13½	Medium.
Raby Castle	" 8	" 23	12½	Medium.
Greenfield	" 8	" 23	12½	Medium.
La Conde	" 12	" 23	11	Medium.
Prince Albert	" 19	" 30	9½	Large.
Champagne	" 19	" 31	4½	Large.
Fraendorfer	" 10	" 31	4½	Large.
Long Bunch Holland	" 11	" 23	2	Medium.
Fay's Prolific	" 12	" 23	2	Large.
Wilder	" 19	" 23	1½	Large.

WHITE CURRANTS (Irrigated)—Test of varieties.

Three plants of each variety were planted in 1908, 6 feet apart each way.

Variety.	Date of first picking.	Date of last picking.	Actual yield from 3 plants.	Size of berry.
			Pints.	
Large White	July 18	July 21	8½	Medium.
White Kaiser	" 19	" 21	7	Large.
Verrieres White	" 16	" 21	7	Large.
White Brandenburg	" 19	" 21	6	Large.
Climax	" 18	" 21	6	Medium
Wentworth Leviathan	" 15	" 30	5	Medium
White Grape	" 16	" 21	4	Large.
White Pearl	" 18	" 30	3½	Medium
White Cherry	" 18	" 21	3	Medium

BLACK CURRANTS (Irrigated)—Test of varieties.

Three plants of each variety were planted in 1908, 6 feet apart each way.

Variety.	Date of first picking.	Date of last picking.	Actual yield from 3 plants.	Size of berry.
			Pints.	
Bang Up	July 10	July 30	9	Small.
Eagle	" 11	" 30	8	Large.
Norton	" 14	" 30	7½	Medium.
Saunders	" 8	" 30	7½	Medium.
Magnus	" 12	" 30	6	Large.
Lee's Prolific	" 8	" 30	6	Medium.
Climax	" 8	" 30	5½	Medium
Beauty	" 19	" 30	5½	Medium
Kerry	" 10	" 23	5	Medium
Ontario	" 7	" 15	5	Medium
Ethel	" 10	" 30	5	Medium
Topsy	" 14	" 30	4½	Large.
Winona	" 19	" 28	3	Large.
Monarch	" 20	" 29	3	Large.
Kerveille de la Gironde	" 6	" 30	3	Medium.

APPLES.

There are four or more trees of the following varieties set out in the irrigated orchard and in the tables is given the amount of fruit obtained from the most productive tree in each case:—

APPLES (Irrigated.)

Variety.	Date first picking.	Weight of wind falls.	Total yield.
		Lb.	Lb.
Yellow Transparent	Aug. 28	1½	10½
Hibernal	" 12		½
Okabena	" 12		½
Dudley	" 12		½
Duchess	" 12		½

CROSS-BRED APPLES (Irrigated).—Test of varieties.

Variety.	Date of first picking.	Total yield
		Lb.
Tony	Sept. 11	87
Magnus	Aug. 29..	52
Jewel	Sept. 3.	46
Robin	" 3	40

ORNAMENTAL GARDENING.

The number of flowers, including bushes, herbaceous perennials, and annuals that there is on our prairies is large, considering the short season and capricious climate. The first to bloom in the spring are the tulips and similar hardy species. These bulbs are set out in the fall, and quite heavily mulched with manure. Our bulbs made a particularly fine showing this year. Following these came a number of herbaceous perennials; the irises and paeonies did particularly well.

Among the annuals, the sweet peas, as usual, were perhaps the most satisfactory. The pansies, pinks, stocks, petunias, verbenas, phlox Drummondii, and a number of others made a brave showing. Most of these, however, were started in hotbeds and bedded out in early June.

Among the flowers, the roses attracted perhaps more favourable comment than anything else, on account of their being less common. These were pruned back in the previous fall to about a foot to fourteen inches from the ground, and were then covered with earth. Among the varieties that bloomed were the following: Margaret Dickson, John Hopper, Paul Neyron, Mrs. J. Laing, Frau Karl Druschki, Magna Charta, Mrs. R. G. Sharman Crawford, Persian Yellow, Caroline Testout, Captain Hayward, and Sir Thomas Lipton.

Some of the shrubs that bloomed freely are the following: *Lonicera tatarica grandiflora, L. Fenzlei, L. flava, Spirea arguta, S. sorbifolia, S. japonica, S. Van Houttei, Syringa villosa.* Some of the other lilacs that did very well are: Charles X, Madam Abel Chatenay, and *Alba grandiflora.* We also had a number of blooms on the following shrubs: *Ribes aureum, Lycium europaeum, Clematis integrifolia, Cytisus hirsutus, Caragana grandiflora, C. frutescens, C. aborescens, Euonymus linearis, Philadelphus coronarius, Rosa rugosa, R. lutea, R. spinosissima.*

TREES FOR WINDBREAKS.

The question of getting a windbreak started around the buildings and garden is one that is of interest to most farmers, and of still greater interest to their wives. The trees that have been used most extensively at the Station and the ones that seem to be the most satisfactory are the native cottonwood and the sharp-leaved, laurel-leaved, and golden willow. The last one is perhaps not quite so hardy as the two former, but grows a trifle faster. The caragana does not grow so tall, but is absolutely hardy, and is ornamental. There are also a number of hardy Russian poplars that could be mentioned.

There are just two essentials to the successful growing of trees under our conditions; the land should be deeply ploughed and summer-fallowed the year previous, and after the trees are set out they should be kept cultivated carefully all summer. Trees cannot be successfully grown among grass and weeds.

LETHBRIDGE.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

HORTICULTURE.

The weather during the spring and summer of 1913 was favorable for the production of both fruit and vegetables. The last frost of the spring occurred on May 18, and after this date there was nothing to prevent the setting of fruit, the only drawback being occasional high winds with the accompanying movement of dust. The windbreaks are making satisfactory growth, and injury from this cause will be impossible before many years.

ORCHARD.

Of the seedling apple trees planted in the spring of 1912, only a small percentage survived the winter owing to the soil blowing and leaving the roots exposed.

Plum seedlings received from the Brandon Experimental Farm also failed to winter for the same reason.

The seeds obtained from apples ripened at Dunstan, Man., and planted here in the fall of 1912, germinated well and made good growth this season. They have been left to winter in the frame and are to be planted out in the spring.

Eight hundred apple seedlings planted this spring have made a good growth. The varieties of which the trees are seedlings are: Handsome White, Blushed Calville, Patten's Duchess, Patten's Greening.

Plums.—The forty-four trees of R. B. White No. 3 which were planted this year have made a weak growth, and the new wood was far from ripe.

Prunus tomentosa (0-279), (0-280), has made a strong, healthy growth.

A small quantity of crab apples of the following varieties ripened: Charles, Progress, Prince, Eve, Robin. Two trees of Pioneer carried bloom, but did not set fruit.

VEGETABLES.

BEANS.

Sown in the open May 20. Rows 30 feet long.

Variety.	Height.	Ready for use.	Yield.
	Inches.		Lb. oz.
Bountiful	22	Aug. 4	28 6
Early Refugee	15	" 12	27 14
Valentine	18	" 4	23 6
[1]Wardwell's Kidney Wax	16	" 3	17 9
Keeney's Rustless Wax	34	" 10	16 7
Stringless Green Pod	18	" 4	15 5
Refugee or 1,000 to 1	15	Sept. 1	4 2

[1]Anthracnose.

A second sowing was made on June 2. The yield was about 60 per cent of the earlier sowing. Refugee or 1000 to 1 requires a longer season than ours.

BEETS.

Sown in the open May 30. Earlier sowing May 6, destroyed by sand. Rows 30 feet long.

Variety.	Ready for use.	Yield.
		Lb. oz.
Meteor	Aug. 12	62 2
Early Blood Red Turnip	" 18	51 13
Eclipse	" 12	48 12
Ruby Dulcet	" 11	48 6
Egyptian Dark Red Turnip	" 15	43 12
Black Red Ball	" 18	25 12

A sowing made on the 9th of June also produced good roots.

BRUSSELS SPROUTS.

Sown in hotbed April 10. Transplanted May 5. Planted out June 6.

Variety.	Quantity grown.	Weight of ten heads.
Dwarf Improved Brussels Sprouts	40 plants	52 lb.

CARROTS.

Sown April 19, germinated May 20, destroyed by sand. Re-sown May 29. Rows 30 feet long.

Variety.	Ready for use.	Yield.
		Lb. oz.
Half Long Chantenay	Aug. 11	48 4
Improved Nantes	" 14	42 8
French Horn	" 16	28 4

French Horn did not yield as well as usual. A later sowing of this variety on June 9 gave almost the same yield.

CAULIFLOWER.

Sown in hotbed April 14, transplanted May 4, planted out June 6. Forty plants of each variety.

Variety.	Ready for use.	Per Cent of Good Heads.
Early Snowball	July 21	45
Extra Selected Early Dwarf Erfurt	" 24	37
Danish Giant	Aug. 7	27

The cabbage maggot was strongly in evidence.

LACOMBE.

CABBAGE.

Sown in hotbed April 10, transplanted May 5, planted out June 6. Forty plants each variety.

Variety.	Ready for Use.	Weight of 10 heads.	Remarks.
		Lb.	
Copenhagen Market (B)	Aug. 4	144	
Copenhagen Market (H)	" 4	122	
Danish Summer Ballhead	" 26	101	
Improved Amager Danish Ballhead	Sept. 2	101	
Flat Swedish	Aug. 30	95	
Magdeburg	" 29	94	
Winningstadt	" 26	93	
Large Late Flat Drumhead	Sept. 2	90	
Fottler's Improved Brunswick	" 2	87	
Extra Amager Danish Ballhead	" 2	80	
Lubeck	Aug. 14	79	
Early Paris Market	" 1	65	Good quality.
Early Jersey Wakefield	" 1	62	
Red Danish Stonehead	Sept. 2	62	
Danish Delicatesse Red	" 2	60	
Small Erfurt	Aug. 26	56	Fair quality.
Extra Early Midsummer Savoy	July 23	50	

The heaviest cabbage was of Copenhagen Market (B) which weighed 28 pounds.

CELERY.

Sown in hotbed April 9, transplanted June 18. Planted in trenches July 5.

Variety.	Average weight of 12 heads.
	Lb. oz.
Evans' Triumph	18 15½
Noll's Magnificent	15 13½
French's Success	15
Giant Pascal	14 8
Rose Ribbed Paris	12
Paris Golden Yellow	9 8
White Plume	9 4
Wegg, A., Lewisville Alta., seed from (Sown Apr. 19)	6 14¾

CUCUMBERS.

Planted May 20. One hill each variety. Hills prepared with half-rotted manure.

Variety.	In Bloom	Yield.
		Lb. oz.
[1]Prize Pickling	July 24	15
Extra Early Russian	Aug. 11	8
Peerless White Spine	" 1	5
Giant Pera	" 1	None set.
Cool and Crisp	" 20	"

[1]Largest 11oz.

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LETTUCE.

Sown April 25, injured by high winds and sand. Re-sown June 9. Rows 15 feet long; plants thinned to 6 inches apart in the row.

Variety.	In use.		Remarks.
	1st sowing	2nd sowing.	
Red Edged Victoria	June 28	Aug. 11	Ran to seed.
Unrivalled Summer	" 28	" 11	
Wheeler's Tom Thumb	Destroyed.	" 1	
Cos Trianon	"	" 26	
All Heart	"	" 9	
Grand Rapids	"	" 5	
Giant Crystal Head	"	" 5	
Black Seeded Simpson	June 28	" 5	
Crisp as Ice	Destroyed.	" 12	
Iceberg	July 3	" 11	
Improved Hanson	Destroyed.	" 6	Ran to seed.
Rousseau Blond Winter	"	" 8	Cos lettuce, earlier
Dark Green Capucine	"	" 20	than Trianon.

ONIONS.

Sown April 9, germinated May 12, destroyed by sand, and re-sown May 29. Rows 30 feet long. Owing to the late sowing the crop did not have time to reach maturity.

Varieties.—Dark Red Beauty, Salzer's Wethersfield, Danver's Yellow Globe, Large Red Wethersfield, Extra Early Red, Early Barletta, White Queen, White Pearl, Red Australian Brown, Red Early Flat.

PARSNIPS.

Sown April 18 in open; destroyed by sand. Rows 30 feet long.

Hollow Crown re-sown May 6, destroyed by sand, yield 17 pounds.

Hollow Crown re-sown May 26, yield 22 pounds.

PARSLEY.

Sown April 18, destroyed by sand. Re-sown June 2, germinated June 23 and grew to a height of 11 inches, the variety being Double Curled.

PEAS.

Planted May 6, in rows 30 feet long.

Variety.	Ready for Use.	Height.	Quality.
		inches.	
Gregory's Surprise	July 17	35	Good
Thomas Laxton	" 18	54	Good.
Nott's New Perfection	" 18	30	
American Wonder	" 19	32	
Premium Gem	" 19	43	
Gradus	" 21	72	Good.
McLean's Advancer	" 21	39	Extra good.
Sutton's Excelsior	" 21	31	
Heroine	" 26	38	
Telephone	Aug. 4	67	
Stratagem	" 11	34	
Juno	" 11	31	

PUMPKINS.

Planted May 21; four hills; yielded 106 pounds 8 ounces. The largest pumpkin weighed 18 pounds 8 ounces.

RADISH.

Sown April 19, partly destroyed by sand. Re-sown June 2, in use July 1. The rows were 15 feet in length.

Variety.	Ready for Use.	Yield and Quality.
Forcing Turnip Scarlet	June 14	Good crop.
Early Scarlet White Tipped	" 14	Good crop.

RHUBARB.

Variety.	In Use.	Yield from three hills. Lb.	oz.	Quality.
Prima Donna	May 25	75	—	Extra Good.
Victoria	" 25	58	12	Good.
Hobday's Giant	" 25	52	12	
Paragon	" 30	46	8	Fair.
Linnæus	" 25	34	8	
Monarque	" 25	29	12	Poor.
Early Raspberry	" 30	22	8	Good.
Daw's Champion	" 25	12	8	

A new plantation was made of the old varieties, ten hills of each: Early Scarlet, Tobolsk, Excelsior, Queen, Royal Albert, Victoria.

SQUASH.

Planted May 20. Hills 9 feet apart each way. Three hills of each variety.

Variety.	Ready for Use.	Yield. Prepared hills. Lb.	oz.	Flat. Lb.	oz.	Remarks.
Long Vegetable Marrow	Aug. 22	241	12	221	8	
*Carter's Trailing Marrow	" 30	150	12	208	4	
Long White Bush Marrow	" 25	122	12	60	8	
Golden Hubbard		112	12	14	4	Not matured.
Summer Crookneck		12		4		Not matured.
Delicious		9	12	6	12	Not matured.
Custard Marrow		3	8	No crops.		Not matured.
Delicata		3		2		Not matured.

*Only one hill; others destroyed by cutworms.

Long White Bush Marrow produced the largest marrow, which weighed 26 pounds.

LACOMBE.

SWEET CORN.

Planted May 6, May 27, June 9. Twenty hills of each variety. The corn was planted at different dates to test the relative merits of the different dates of planting. The early date gave the best results and the following notes are from that planting:

SWEET CORN.

Variety.	Height.	Date tasselled.
	inches.	
Early Malcolm	61	July 23
Fordhook Early	70	" 25
Golden Bantam	65	Aug. 4
Early Iowa	65	July 25
*Squaw Corn	81	Aug. 4
Henderson's Metropolitan	84	" 4
Extra Early Adams	80	" 2
Carter's Improved Sweet	69	July 24
Perkin's Early	77	Aug. 4

*Not the "Squaw" usually grown in the West under that name.

Early Malcolm produced a small number of cobs.

SALSIFY.

Seed of Long White salsify was sown in the open on April 19 in a row 30 feet long. The yield was 7 pounds of poor quality roots.

TOMATOES.

Sown in hotbed April 3, transplanted May 22, planted out June 25. Ten varieties were sown, and all but Florida Special produced small quantities of green fruit. Alacrity and Rennie's Earliest ripened a small quantity.

TURNIPS.

Sown April 19, destroyed by high winds and sand. Re-sown on May 6, and partly destroyed by drifting sand. Re-sown on June 2 in 30-foot rows.

Variety.	Sown.	Ready for Use.	Yield.	Quality.
			Lb.	
Early White Flat Strap Leafed	June 2	Aug. 3	81	Strong flavour.
Extra Early White Milan	" 2	July 12	102	Good.
Dupuy and Ferguson Favourite Swede	" 2	Sept. 1	27	

FERTILIZER TEST.

Eight plots of one-fortieth acre each were used for a fertilizer test, four with field peas and four with beans. The fertilizers were: (1) potash, (2) phosphoric acid, (3) a mixture of potash and phosphoric acid, and the fourth plot was used for a check plot.

Peas were planted on May 10 and the potash -phosphoric acid plot came nearest maturity.

Planted on May 20.

LACOMBE.

BEANS.

Plots.	In Bloom.	Yield.	
		Lb.	oz.
1. Check plot	July 17	218	3
2. Potash-Phosphoric Acid	" 17	251	3
3. Potash	" 17	174	9
4. Phosphoric Acid	" 17	412	11

FERTILIZER TEST WITH CABBAGE.

Sown in hotbed April 10.

Variety.	Seedsman.	Fertilizer.	No. of heads.	Weight
				lb.
Copenhagen Market	B	Nitrate of soda	10	115
Copenhagen Market	B	Swift's	10	144
Copenhagen Market	B	Check row	10	130
Copenhagen Market	H	Nitrate of soda	10	109
Copenhagen Market	H	Swift's	10	140
Copenhagen Market	H	Check row	10	122

FLOWER GARDEN.

Variety.	Sown in hotbed.	Transplanted.	In Bloom.	
			From	To
Acroclinium, 3 varieties	April 7	June 13	June 30	Oct. 13
Ammobium alatum	" 7	" 13	July 12	" 13
Antirrhinum	" 4	" 19	" 24	" 13
Aster, 34 varieties	" 7	" 13	Aug. 12	" 6
Alonsoa, 2 varieties	" 4	" 26	" 14	Sept. 18
Balsam	" 4	" 26	July 19	" 6
Calliopsis radiata	" 7	" 13	" 24	" 18
Candytuft, 2 varieties	" 9	" 26	" 8	Oct. 13
Clarkia elegans	" 9	" 27	" 11	Sept. 18
Cockscomb	" 4	" 16	" 24	" 6
Coreopsis, 8 varieties	" 7	" 24	" 19	" 18
Cosmos	" 4	May 22	June 25	" 19
Dianthus superbissimus	" 10	June 26	Aug. 5	Oct. 13
Dimorphotheca aurantiaca	" 10	" 10	June 30	" 6
Gaillardia, 2 varieties	" 4	" 16	Aug. 1	Sept. 6
Godetia, 2 varieties	" 9	" 26	July 18	Oct. 13
Helichrysum	" 7	" 13	Aug. 8	" 13
Larkspur (annual) 3 varieties	" 7	" 27	July 31	" 13
Linaria	" 4	" 10	" 9	" 13
Lobelia, 2 varieties	" 4	May 22	" 19	" 14
Marigold, African	" 10	June 25	" 26	Sept. 6
Marigold, French	" 10	" 16	" 9	" 6
Marvel of Peru	" 4	May 22	" 28	" 6
Mignonette	" 9	June 16	" 14	Oct. 13
Nemesia, 5 varieties	" 4	" 16	June 30	" 6
Pansy, 2 varieties	" 4	May 22	July 25	
Petunia, 3 varieties	" 4	June 19	" 31	Oct. 6
Phlox Drummondii, 7 varieties	" 7	" 14	" 30	" 6
Portulaca	" 4	" 16	" 19	Sept. 6
Salpiglossis, 6 varieties	" 10	June 16	July 24	" 6
Scabiosa, 6 varieties	" 7	" 19	Aug. 10	" 18
Stocks (ten week) ,12 varieties	" 4	May 22	June 30	Oct. 14
Sultan Sweet, 3 varieties	" 4	June 16	Aug. 13	Sept. 6
Swan River Daisy	" 7	" 16	July 24	Oct. 13
Verbenas, 6 varieties	" 4	" 16	Aug. 14	" 6
Violas, 5 varieties	" 4	May 22	July 29	" 14

LACOMBE.

SWEET PEAS.

Seed was planted in the flower border on April 16. The first to bloom was Paradise Ivory, on the 12th of June. Choice blooms were produced by Asta Ohn. In all, seventy-two varieties were grown. A small quantity was started in the cold frame and transplanted, but the results did not warrant the additional work.

FLOWER SEED SOWN IN THE OPEN BORDER.

Variety.	Sown.	In Bloom.	
		From	To
Nasturtium, tall, 5 varieties	May 28	July 25	Sept. 6
Nasturtium, Tom Thumb, 7 varieties	" 12	July 17	" 6
Lupines	" 12	June 30	" 6
Poppies, 4 varieties	" 12	July 26	" 6
Virginian Stocks	" 12	Aug. 1	" 6

CANNAS.

Fourteen named varieties were started in the hotbed May 19. Progression produced a flower spike, but was cut by frost before opening.

GLADIOLI.

One hundred bulbs were planted on May 15 in the border. Several flower spikes commenced to open about the 6th of September when the frost cut them.

DAHLIAS.

Started in hotbed May 19. Planted out June 24. Bloom over September 6.

Variety.	Height.	n Bloom.
	Inches.	
M. D. Hallock	33	July 28
Evadne	39	Aug. 4
Ernest Glasse	29	" 5
Gabriel	46	" 7
Cactus Queen	36	" 7
Cycle	23	" 7
Kingfisher	31	" 13
Clifford W. Bruton	49	" 9
Bon Ton	34	" 17
Capstan	31	" 18
Austin Cannell	42	" 19
Sylvia	44	" 19
Kynerith	40	" 19
Hector	35	" 23
Cannell's Gem	28	" 23
Countess of Lonsdale	19	" 25
Mrs. Charles Turner	21	" 25
Cuban Giant	27	" 23
Iridescent	21	" 26
Empress of India	31	" 28
Matchless	21	" 29
Mrs. Leopold Seymour	23	" 30
Susan Ingham	18	Sept. 1

TULIPS.

Planted October 18, 1912.

Name.	In bloom.	Name.	In bloom.
Artus	May 24	Imperator Rubrorum	May 24
Cottage Maid	" 24	Chrysolora	" 24
Joost Van Vondel (red)	" 24	Keizerskroon	" 25
Joost Van Vondel (white)	" 24	La Reine	" 24
Pottebakker (scarlet)	" 24	Proserpine	" 24
Pottebakker (white)	" 24	Vermilion Brilliant	" 24
Duchesse de Parma	" 25	Couronne d'Or	" 24
Murillo	" 25		

LATE FLOWERING TULIPS.

Name.	In bloom.	Name.	In bloom.
Darwin	June 4	Picotee	June 4
Gesneriana Spathulata	" 4	La Candeur	" 4
Isabella	" 4	Yellow Rose	" 4
La Merveille	" 6		

NARCISSUS.

Planted October 18, 1912.

Name.	In bloom.	Name.	In bloom.
Golden Spur	May 31	Emperor	May 30
Sir Watkin	" 31	Princeps	" 29
Cynosure	" 31	Poeticus	June 8
Figaro	June 5	Poeticus ornatus	" 8

The old bulbs were taken up after blooming to make room for annuals. These, together with 4,400 new bulbs, were planted on the 20th of October, 1913.

PERENNIALS.

A large number of the plants received in the fall of 1912, failed to winter. The border planted with them is at present rather exposed. The following survived and produced a small amount of bloom: *Delphinium, Aconitum, Iris, Spirea, Phlox, Thaliortum, Geranium, Phalaris arundinacea, Rudbeckia, Gypsophila paniculata, Dicentra spectabilis, Dictamnus, Aquilegia, Hemerocallis, Paeonia, Cimicifuga, Liatris, Helianthus, Platycodon, Boltonia.*

LACOMBE.

SMALL FRUITS.

A new plantation was made of red, white and black currants. Alternate rows of currants and raspberries were put in, and both made a satisfactory growth during the season. The following varieties have been tested here and the yields are given herewith in rate per acre.

BLACK CURRANTS.

Variety.	Yield per acre.	Variety.	Yield per acre.
	Lb.		Lb.
Magnus	13,108	Ethel	4,678
Lee's Prolific	12,604	Saunders	2,545
Beauty	12,402	Topsy	2,520
Monarch	11,495	Eagle	2,319
Merveille de la Gironde	10,860	Eclipse	1,815
Success	8,570	Ontario	1,815
Bang Up	6,856	Climax	1,714
Norton	6,856	Kerry	907
Ogden	5,848	Winona	605

RED CURRANTS.

Long Bunched Holland	10,839	Early Scarlet	2,547
Greenfield	10,310	Cumberland Red	2,218
Albert	8,016	Red English	2,016
Red Dutch New	7,789	Raby Castle	1,815
Red Dutch	7,058	Moore's Seedling	1,613
Rankin's Red	5,797	Champagne Red	1,487
Pomona	5,697	Victoria	1,343
Benwell	5,292	Wilder	579
Large Red	4,033	Prolific	517
La Conde	3,630	Frauendorfer	No crop.
Red Grape	2,772		

WHITE CURRANTS.

White Cherry	6,050	Fyatt Nova	1,210
White Grape	3,831	White Pearl	1,159
Wentworth Leviathan	2,934	Large White	1,058
Large White Brandenburg	2,243	White Kaiser	529
Climax White	2,041		

LACOMBE.

HARDY AND DESIRABLE TREES AND SHRUBS.

Variety.	In Bloom.	
	From	To
Lilacs—		
Syringa villosa	June 21	July 28
Charles X	" 8	June 30
Syringa vulgaris Boussingault	" 3	" 28
Syringa vulgaris rubella plena	" 3	" 24
Syringa japonica	" 19	July 11
Syringa amurensis	July 10	" 17
Syringa Josikaea eximia	June 30	" 15
Cornus alba sibirica (Dogwood)	" 19	" 3
Cotoneaster	" 7	Aug. 3
Caragana (six varieties)	May 29	June 24
Rosa rugosa	July 20	Sept. 10
Spiræa Van Houttei	June 11	July 11
Evergreens—		
Rocky Mountain Blue Spruce (Colorado Blue Spruce)	.....	.....
Black Hill Spruce	.....	.....
Scotch Pine	.....	.....
Lonicera (Bush Honeysuckle)	June 6	July 6

POTATOES.

Thirty-two varieties of potatoes were tested at Lacombe this season. They were planted in rows 30 inches apart, the cuttings being dropped about 14 inches apart in the row. The soil was black, clay loam ploughed out of cultivated grass in July of the previous season, and well worked in the fall.

Name of Variety.	Planted.	Dug.	Average size.	Total yield per acre.	Total yield per acre of sound	Total yield per acre of rotten.	Total yield marketable.	Total yield unmarketable.	Form and Colour.
				Bush. Lb.			Bush. Lb.	Bush. Lb.	
Wee McGregor	May 16...	Sept. 22	Large	469 42		All sound	441 31	28 11	Smooth, white, oval.
Table Talk	" 16...	" 22	Medium	464 12		"	406 30	55 42	White, oval.
Gold Coin	" 16...	" 22	"	456 30		"	401 13	54 47	White, oval.
Empire State	" 16...	" 22	Large	455 24		"	432 38	22 46	White, oval.
Epicure	" 16...	" 22	Medium	442 12		"	389 8	53 4	Deep eyes, red, oval.
Morgan Seedling	" 16...	" 22	Large	433 24		"	396 34	36 50	Pink, long.
Houlton Rose	" 16...	" 22	"	431 12		"	396 42	34 30	Red, smooth, long.
King Edward VII	" 16...	" 22	Medium	426 48		"	349 59	76 49	Deep eyes, pink, round.
Late Puritan	" 16...	" 22	Large	413 36		"	380 31	30 5	White, oval.
Holborn Abundance	" 16...	" 23	Medium	399 18		"	343 24	55 54	White, oval.
Early Norther	" 16...	" 23	Large	382 48		"	344 31	38 17	Smooth, red, long.
Early Hebron	" 16...	" 23	"	370		"	347 49	26 11	Smooth, pink and white, long.
New Queen	" 16...	" 23	"	353 6		"	335 27	17 39	Long, round, red.
American Wonder	" 16...	" 23	"	349 48		"	321 49	27 59	White, oval.
Rawlings (Ashleaf) Kidney	" 16...	" 23	Medium	336 36		"	282 45	53 51	White, oval.
Dreer's Standard	" 16...	" 23	"	310 24		"	265 14	36 10	White, oval.
Money Maker	" 16...	" 23	"	292 36		"	251 38	40 58	White, long.
Langworthy	" 16...	" 22	Small	292 36		"	175 34	117 2	White, irregular.
Irish Cobbler	" 16 ..	" 22	Medium	286 00		"	228 48	57 12	White, round.
Everett	" 16...	" 22	"	272 48		"	223 42	49 6	Red, oval.
Vick's Extra Early	" 16 ..	" 22	"	268 24		"	236 11	32 13	Pink and white, oval.
British Queen	" 16...	" 22	Large	261 48		"	235 37	26 11	White, oval.
Country Gentleman	" 16...	" 23	Medium	253		"	222 38	30 22	Pink, oval.
Carman No. 1	" 16...	" 22	"	226 36		"	199 24	27 12	White, oval.
Hard to Beat	" 16...	" 22	Small	211 12		"	135 10	76 2	Flat, white.
Rochester Rose	" 16...	" 22	Medium	195 48		"	156 38	39 10	Pink, long.
Factor	" 16...	" 22	Small	167 12		"	108 41	58 31	Round, white.
Reeves Rose	" 16...	" 22	"	158 24		"	133 3	25 21	Red, oval.
Ohio	" 16...	" 23	"	145 12		"	75 30	69 42	Round, red.
King	" 16...	" 22	Large	136 24		"	124 48	11 36	White, pink eyes, long and round.
Dalmeny Beauty	" 16...	" 22	Small	107 48		"	81 56	25 52	White, long.
Bermuda Early	" 16...	" 23	"	52 48		"	21 8	31 40	Round, red.

EXPERIMENTAL FARM, AGASSIZ, B.C.:

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

The principal work carried on in 1913 was the variety-testing of vegetables, 105 varieties of which were grown with more or less success. Next in importance came the variety-testing of flowers and the care of the bulbs, and border plants, cutting the grass and keeping all the grass land, shrubbery, and roads in as good condition as time would permit.

A small orchard of about 4 acres was planted, containing apples, pears, plums, cherries, blackberries, gooseberries, red and white currants, and strawberries. This, coupled with some ornamental nursery stock, also demanded attention.

VEGETABLES.

Among the vegetables tested, about the only ones which proved a failure were those belonging to the *cruciferæ*, for all of these were attacked by the cabbage maggot. This pest appeared to come this year with much greater vehemence as compared with other years, probably because the garden was very close to that of last year. Mr. R. C. Treherne, of the Entomological Division, conducted a number of experiments on this insect in the gardens here. The yields obtained do not warrant publishing comparable variety tests on this family of plants.

CELERY.

Very good celery was grown. The season of growth was about 190 days. The soil was a sandy loam. The plants were put into a trench and gradually hilled up. The White Plume was the best in quality. From a 15-foot drill there were harvested 86¾ pounds, but this was nearly the lightest yield of the five varieties tried. The largest yield was from Noll's Magnificent, yielding from the plot, or 15-foot row, 136 pounds. The next in respect to yield was Evans' Triumph, giving 120½ pounds per lot.

Variety.	Date planted.	Length of drill.	Weight of plants.	
		Feet.	Lb.	oz.
Noll's Magnificent	March 24...	15	136	0
Evans' Triumph	" 24...	15	120	8
French Success	" 24...	15	102	0
White Plume	" 24...	15	86	4
Giant Pascal	" 24...	15	82	8

TOMATOES.

Ten varieties of tomatoes were grown. All were started in a hotbed from seed, and planted out when the danger of frost was over. They were trained to a single stem, tied to a stake, and kept reasonably pruned. The weight results are given from five average plants, and all fruit was weighed ripe, as picked.

The earliest variety to produce well-ripened fruit was Sparks' Earliana (Sunnybrook strain), and this ripened on July 29. This variety was also the heaviest yielder, giving 42¾ pounds per plot. The next highest yielder was the next earliest, being Prosperity. These ripened on August 4, and yielded 42 pounds. The third in yield and earliness was Bonny Best, which ripened on August 4 and yielded 37¼ pounds. Chalk's Early Jewel ripened early but was the most shy bearer of the ten varieties tested this year. The others yielded between the extremes given, and the latest one to ripen was Alacrity (C.E.F. strain), which matured August 11.

Variety.	Date planted.	Date harvested.	Weight of five average plants.	
			Lb.	oz.
Sparks' Earliana (Sunnybrook strain)	April 1	July 29	42	12
Prosperity	" 1	Aug. 4	42	0
Bonny Best	" 1	" 4	37	4
Florida Special	" 1	" 10	32	8
North Adirondack Earliana	" 1	" 10	32	2
I. X. L.	" 1	" 5	31	12
Alacrity (C.E.F.), (2-24-10)	" 1	" 11	31	12
Alacrity (C.E.F.), (2-24-9)	" 1	" 11	25	12
Chalk s Early Jewel	" 1	" 8	23	8

SQUASH.

Six varieties of this vegetable were tested on a very uniform piece of land. They were all planted on May 7, and harvested as soon as fit for table use. The weight of crop was taken from three hills. Delicious, the earliest one, gave the largest yield (320¾ pounds), and was fit for use on August 4. The next largest yielder was Mammoth Whale, giving 130 pounds 6 ounces, but maturing as late as September 1. The latest one was the Golden Hubbard, and it also gave the lightest yield (26 pounds). The Hubbard was third on the list in yield and also the third to mature. The remaining two, Custard Marrow and Summer Crookneck, matured in good season, but both were very shy yielders.

Variety.	Date planted.	Date harvested.	Weight of three hills.	
			Lb	oz
Delicious	May 7	Aug. 4	320	8
Mammoth Whale	" 7	Sept. 1	130	6
Hubbard	" 7	Aug. 20	90	0
Summer Crookneck	" 7	" 10	46	3
Custard Marrow	" 7	" 18	42	0
Golden Hubbard	" 7	Sept 28	26	0

BEETS.

Six varieties of table beets were grown and harvested when they were large enough to give a crop and still fit for table use. Had they been allowed to grow longer the yields would have been heavier, but their usefulness as table beets would have been outlived. The weights of the crops were taken from two drills 15 feet long and 30 inches apart, and the plants were thinned to 4 inches in the row. They were

planted on April 24, and harvested from July 12 to July 18. The two giving the lowest yields gave the best quality of beet, these being Early Blood Red turnip and Black Red Ball, each yielding 52½ pounds per plot. Next to these, and of nearly equal quality, was the Egyptian Dark Red Turnip, yielding 60 pounds; Meteor, yielding 72½ pounds; Ruby Dulcet, yielding 63 pounds; and Eclipse, yielding 105½ pounds, were all stringy and not of good quality, although they received the same treatment accorded all the others.

Variety.	Date planted.	Date harvested.	Weights.
			Lb. oz.
Eclipse	April 24	July 18	105 4
Meteor	" 24	" 17	72 8
Ruby Dulcet	" 24	" 16	63 0
Egyptian Dark Red Turnip	" 24	" 14	60 0
Early Blood Red Turnip	" 24	" 12	52 8
Black Red Ball	" 24	" 14	52 8

PEPPERS.

Three varieties of peppers were grown, but only a small portion of the fruit ripened. They were planted April 1, and harvested as they ripened, up to October 1. They were grown in plots of two drills 15 feet long and 30 inches apart, and 18 inches apart in the rows. In yield of ripe peppers, the Neapolitan gave the most, namely 26¾ pounds. Chili was second, with a yield of 20 pounds, and Cayenne third, giving 13¼ pounds. This is the first time in the past three years that we have ripened peppers at all.

Variety	Date planted.	Date harvested.	Weights.
			Lb. oz.
Neapolitan	April 1	Sept. 24	26 12
Chili	" 1	" 28	20 0
Cayenne	" 1	Oct. 1	13 5

SALSIFY.

Only one variety of salsify was grown, that being the Long White. It was planted on April 15, harvested in October, and yielded 20 pounds from a plot of two rows 15 feet long and 30 inches apart, thinned to 1½ inches in the row. It was only of fair quality.

PARSNIPS.

There was also one variety of parsnips grown, the Hollow Crown. The plot contained two rows 15 feet long, 30 inches apart and plants thinned to 4 inches in the rows. The quality was good and the yield was 80 pounds. This variety has always given us good results in the past, and, even with its high yield, has very good quality.

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CUCUMBERS.

Of the five varieties of cucumbers grown, two were almost a total failure, namely, the Prize Pickling and the Extra Early Russian. They were grown in hills 6 feet apart each way and the weights were taken from three hills. They were planted on May 7 and harvested from August 10 to August 28. Cool and Crisp gave the largest yield (40¼ pounds), and matured August 10, as did the Peerless White Spine, but the latter only yielded 21 pounds to the plot. Giant Pera yielded 22½ pounds to the plot, but did not mature until August 20. None of the varieties yielded at all heavily.

Variety.	Date planted.	Date harvested.	Weights.	
			Lb.	oz
Cool and Crisp	May 7	Aug. 10	40	4
Giant Pera	" 7	" 20	22	8
Peerless White Spine	" 7	" 10	21	0
Prize Pickling	" 7	" 26	5	0
Extra Early Russian	" 7	" 28	2	8

CORN.

Considering the cool, damp season, sweet corn grew an average crop. Ten varieties were grown, and were in hills 3 feet apart each way. The yield is taken from twelve hills. The ears were taken when they were best fit for use on the table. All varieties were planted on May 15. The earliest varieties, Fordhook Early, Early Malcolm (C.E.F. strain), Golden Bantam, and Extra Early Adams all matured before September 8. The last-named variety gave the highest yield per plot, having 48½ pounds of good cobs. Fordhook Early was the second highest yielder, with 40 pounds; Golden Bantam and Early Malcolm were two of the lightest yielders, giving 17 pounds and 16½ pounds, respectively, but the corn was of extra good quality, and they produced about the same number of ears, only they were smaller.

Variety.	Date planted.	Date harvested.	Weights.	
			Lb.	oz.
Extra Early Adams	May 15	Sept. 8	48	8
Fordhook Early	" 15	" 4	40	0
Early Evergreen	" 15	" 16	38	0
Black Mexican	" 15	" 22	37	4
Henderson's Metropolitan	" 15	" 18	34	8
Stowell's Evergreen	" 15	" 30	33	8
Country Gentleman	" 15	Oct. 1	32	0
Perkins' Early	" 15	Sept. 8	23	8
Golden Bantam	" 15	" 9	17	0
Early Malcolm (C.E.F.)	" 15	" 5	16	8

LETTUCE.

Eleven varieties of lettuce were planted on April 1, and the first became fit to harvest on June 6, as an entire crop. The weights were taken from a row 15 feet long. The rows were 15 inches apart and the plants were thinned to 6 inches in

the row. Giant Crystal Head was this year the earliest, and also the heaviest cropper, producing 51 pounds per plot. The quality was extra good. Next in order of yield, although somewhat later, was Black Seeded Simpson, which produced 46¾ pounds. The third in yield was Grand Rapids, producing 41½ pounds. The quality of all three was very good.

Variety.	Date planted.	Date harvested.	Weight 30 plants.	
			Lb.	oz.
Giant Crystal Head	April 1	June 6	51	0
Black-seeded Simpson	" 1	" 28	46	14
Grand Rapids	" 1	" 14	41	4
Improved Hanson	" 1	" 20	32	12
Iceberg	" 1	" 20	31	14
Dark Green Capucine	" 1	" 25	31	0
Crisp as Ice	" 1	" 20	13	8
All Heart	" 1	" 20	13	8
Unrivalled Summer	" 1	" 24	13	2
Red Edged Victoria	" 1	" 28	9	0
Rousseau Blood Winter	" 1	" 24	6	0

CARROTS.

Carrots were grown in rows 30 inches apart and thinned to 1½ inches in the row. All varieties were harvested when just at the small stage fit for table use. They were planted on April 15 and all harvested by July 10. The French Horn gave the highest yield, namely, 33¾ pounds. Improved Nantes gave a yield of 30½ pounds, and the Half Long Chantenay gave 29 pounds per plot. They were all very good as table carrots.

Variety.	Date planted.	Date harvested.	Weights (36-ft. row)	
			Lb.	oz.
French Horn	April 15	July 1	33	4
Improved Nantes	" 15	" 10	30	8
Half Long Chantenay	" 15	" 10	29	0

BEANS.

Some seven varieties of beans were grown and harvested only as green or string beans, in the very best stage for table use. They were grown in rows 30 inches apart and the plants left 2 inches apart in the rows. They were planted April 24 and harvested from July 7 to July 22. The best yielder was Keeney's Rustless Wax, which gave 31 pounds, or a little over 9 tons per acre. The lightest yield was that of Wardwell's Kidney Wax, which was 26 pounds, or over 7 tons per acre. Others which gave fair yields nearly equal to the first mentioned were: Early Refugee, Refugee or 1000 to 1, and Valentine. More weight per acre could easily have been obtained had they been left a few days longer in each case, but the extra weight would have been at the sacrifice of the quality.

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Variety	Date planted.	Date harvested.	Weight of 30-foot drill	
			Lb.	oz.
Keeney's Rustless Wax	April 24	July 11	31	0
Early Refugee	" 24	" 20	30	0
Bountiful	" 24	" 18	29	0
Stringless Green Pod	" 24	" 22	29	0
Refugee or 1000 to 1	" 24	" 22	28	2
Valentine	" 24	" 16	28	0
Wardwell's Kidney Wax	" 24	" 7	26	0

PEAS.

Twelve varieties of peas were planted about April 15, and the first to be fit for use were harvested June 26. They were planted in rows 3 feet apart and the plants were, as nearly as possible, 1 inch apart. They were all harvested while in the very highest condition for table use and were not left to mature to make large yields. The earliest variety was Gregory's Surprise, and the next was Thomas Laxton, but both of these were light yielders. The heaviest yielder was Heroine, giving in the pod something over 7 tons per acre. Others very close to this standard were: McLean's Advancer, American Wonder, Juno, Telephone, and Gradus. The tall varieties were rodded on ordinary tree branches, and these made excellent trellis work, as none were ever broken down, and they were easy to pick from.

Variety	Date planted.	Date harvested.	Weight 30-ft. drill.	
			Lb.	oz.
Heroine	April 15	July 22	30	8
McLean's Advancer	" 15	" 10	28	0
American Wonder	" 15	" 10	21	0
Juno	" 15	" 22	20	12
Telephone	" 15	" 16	20	8
Premium Gem	" 15	" 11	19	8
Gradus	" 15	" 7	18	12
Stratagem	" 15	" 9	18	8
Gregory's Surprise	" 15	June 26	16	12
Nott's New Perfection	" 15	July 9	15	12
Sutton's Excelsior	" 15	" 9	14	4
Thomas Laxton	" 15	June 28	14	0

POTATOES.

Twenty-three varieties of potatoes were grown on a very uniform piece of ground. It was fall-ploughed clover sod, and a light application of barnyard manure was given. The potatoes were planted in rows 30 inches apart and about 1 foot apart in the rows. They were well cultivated during the season and hilled up when the tops got large enough to cover the row space.

To try to prevent the late blight, they were sprayed with Bordeaux mixture four times during the season. The season being a very wet one, it was difficult to choose a time when rain would not more or less wash the spray mixture off. In every variety there were some tubers affected by the disease at digging time, and, after being stored for a time in a cool, dark cellar, a great many more spoiled.

Under the present system, it seems difficult to get a uniform variety test, for probably the best half-dozen varieties change places in as many years, and occasionally

one will drop very low without any apparent reason. This means, of course, when they are taken from the yield standpoint exclusively. In the following list results are given in order of marketable yield of the twelve most productive varieties. All small, ill-shaped and very large tubers are not termed marketable. It will be noted that Wee MacGregor leads the list with a gross yield of 12¼ tons, and a marketable yield of 9 tons 1,645 pounds. The second one, marked "Unknown" was a sample sent to us by Mr. F. Stanton, of Hood River, Oregon, and to date we have not got a name for it. Probably partially owing to the change of soil and climate, it grew very strongly and the potatoes were somewhat rough. The fourth variety is one sent by Mr. Angus Cameron, Proctor, B.C. It is one of his own production and a very smooth, white potato, apparently suitable for a main crop.

The best early potato, from the point of yield, earliness, uniformity, and quality, was Early St. George. It is a white-skinned, smooth, long, white potato of excellent cooking quality, yielding at the rate of 8 tons 1,820 pounds per acre in 1913.

All the varieties reported on were planted May 22.

Variety	Harvested.	Average size.	Season.	Yield per acre.		Yield per acre marketable		Per cent Rot.	Form and colour.
				tons.	lb.	tons.	lb.		
Wee MacGregor	Sept. 15	Large	Medium early	12	552	9	1645	5	Oblong, white.
Unknown	" 17	Medium	Very late.	11	1364	9	691	8	Long, red
Morgan Seedling	" 15	Large	Late	11	836	9	268	2	Oblong, pink.
Cameronian	" 17	"	"	12	440	8	1315	10	Long flat white.
Everett	" 17	"	"	10	64	7	1649	10	Long, red.
Gold Coin	" 16	Medium	"	9	744	7	995	5	Round, white.
Carman	" 15	"	"	9	348	7	678	10	Round, white.
Money Maker	" 17	"	"	10	856	7	599	10	Long, white.
Dalmeny Beauty	" 16	Large	Medium	9	1404	7	553	10	Long, flat white.
Rawlings Kidney (Ashleaf Kidney)	" 15	Medium	"	9	1272	7	454	10	Long, rough, white.
Irish Cobbler	" 17	"	Medium early	9	612	6	1772	10	Round, white.
Empire State	" 17	"	Late	9	1668	6	1767	10	Long, white.

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THE COMMERCIAL APPLE ORCHARD.

The last original apple orchard was removed during early spring. This orchard, although comparatively young, was badly diseased, being affected with the apple tree Anthracnose (*Gloeosporium malicorticis*). During the last two seasons not a single tree produced any No. 1 apples, and many of the trees did not fruit at all. Indeed, since the year 1911 little or no first-grade fruit has been produced. In that year the orchard was sprayed and pruned and clean cultivation was practised. In 1913 the clover was cut twice as green feed. There is no record of the treatment previous to 1911.

In the table given below will be found a record of the varieties planted and the dates of planting. Some of the trees died at different stages and were replaced by others of the same variety. In each case a record was kept and the results are given in the fourth and fifth columns of the table. Next, the number of trees living in 1914 is given, and their condition when taken out. Finally the last column gives the entire yield of No. 1 fruit from each variety.

It should be mentioned here that the total number of trees planted originally in 1905 was 108. Of these, nineteen died in 1909, the same number in 1910, and in the year 1911 thirty-nine trees died. Thus in six years 71 per cent, or nearly three-quarters of the original number of trees died. From time to time the dying trees were replaced by others and, in addition, more varieties were planted. The total number of trees planted from 1905 to 1910, including the original setting, was 209. Of these, only sixty-four were living in 1914. In other words, during a period of nine years, only 30·6 per cent of all the trees planted survived, and of this number not a single tree was free from disease. Of the varieties tried, the King and the Grimes' Golden gave the best results.

Number and dates of trees replanted.	Number of trees living in 1914.	Condition in 1914.	Entire yield of No. 1 fruit.	Variety.	Number of trees planted	Date of planting.	Number and dates of trees which died.
			lbs.				
0, ...	6	Badly diseased.....	574.....	Grimes' Golden.....	12	1905	2, 1911. 4, 1912.
3, 1910.....	2	Very badly diseased.....	418.....	Ontario.....	12	1905	1, 1909. 3, 1910. 5, 1911. 4, 1912.
0, ...	4	Very badly diseased and stunted.....	120.....	Salome.....	12	1905	2, 1909. 2, 1910. 3, 1911. 1, 1912.
0, ...	0	.....	80.....	Aiken.....	12	1905	1, 1907. 4, 1909. 1, 1910. 2, 1911. 4, 1912.
1, 1910.....	4	Very badly diseased and three-fourths dead.....	200.....	Mother.....	12	1905	4, 1910. 4, 1911. 1, 1912.
3, 1910.....	2	Badly diseased.....	160.....	Jonathan.....	12	1905	2, 1909. 5, 1910. 6, 1911.
4, 1910.....	2	Only partly alive.....	84.....	Sutton Beauty.....	12	1905	6, 1909. 3, 1910. 5, 1911.
0, ...	7	Some disease, reasonably strong	415.....	Tompkins King.....	12	1905	1, 1910. 3, 1911. 1, 1912.
4, 1910	0	.....	160.....	Mammoth Pippin.....	12	1905	4, 1909. 9, 1911. 3, 1912.
1, 1909	4	Badly diseased.....	No record.....	Winter Banana.....	12	1906	1, 1909. 4, 1911. 3, 1913.
0, ...	5	Very badly diseased.....	10.....	Cox's Orange Pippin.....	12	1906	2, 1910. 3, 1911. 2, 1912.
0, ...	6	Dying and very badly diseased.....	A few apples ..	Rhode Island Greening.....	12	1907	2, 1911. 4, 1912.

1, 1910	5	Badly diseased	No fruit	Wagener	12	1909	1, 1910.
							4, 1911.
							3, 1912.
0,	6	Diseased in spots	"	Delicious	12	1910	1, 1910.
							5, 1913.
0,	3	Spotted with disease	"	Belle de Boskoop	12	1910	4, 1913.
							5, 1914.
0,	8	Some disease	"	Rome Beauty	12	1910	4, 1914.

HERBACEOUS PLANTS.

The herbaceous plants in the border have made satisfactory growth as a whole and have made a reasonably good showing.

The following list will, in a general way, indicate the varieties that are worthy of note for climatic conditions such as have been experienced at this Farm.

Delphiniums, in variety.
Chrysanthemum maximum, King Edward VII, Mrs. Lothian Bell.
Iris, *germanica*, *sibirica*, and Japanese.
Lupines, blue and white.
Erigeron speciosus.
Doronicum plantagineum excelsum.
Campanulas, in variety.
Papaver orientale, Salmon Queen, Mrs. Perry.
Aster, Michaelmas daisies.
Peony, herbaceous in variety.
Achillea, the Pearl.
Gypsophylla paniculata, *paniculata flore pleno.*
Hollyhocks, single and double varieties.
Antirrhinums, in variety.
Rudbeckia Newmanii.
Helianthus, Soleil d'or.
Spiraea, *Aruncus*, *palmata*, *Venusta.*
Tritoma uvaria, *grandiflora.*
Trollius europaeus, Orange globe.
Anemone japonica alba, *rosea* and *flore pleno.*
Montbretias, in variety.
Inula glandulosa, and *macrocephala.*
Aquilegias.
Hemerocallis flava.
Sweet William.
Anchusa italica, Dropmore variety.
Geranium sanguineum.
Phlox, early and late varieties.
Thalictrum.
Veronica spicata.

FLOWERING AND DECIDUOUS SHRUBS AND TREES.

The trees and shrubs about the buildings have been thinned out and pruned considerably, and some varieties are improving greatly after having been given more room. Some labelling has been done, but we still have much to do.

The appended list includes many of the species and varieties that appear to grow best under our climatic conditions.

Berberis, in variety. *Thunbergii*, *vulgaris*, *Darwinii*, *stenophylla* and *Aquifolium.*
Kerria, *japonica flore pleno.*
Cornus sanguinea elegantissima.
Deutzia crenata, *rosea*, *flore pleno*, and also the white variety.
Deutzia, *crenata rosea flore pleno*, and also
Pyrus japonica.
Ribes sanguineum and *album.*
Forsythia suspensa.
Purple-leaved hazel.
Hydrangea paniculata grandiflora.
Rhododendrons, in variety, hybrids, seedlings.
Azalea *mollis*, *pontica*, and Ghent varieties.
Kalmia latifolia.
Lilac, Chas. X., Pres. Carnot, Persian, and President Grevy.
Lilac, Mad. Lemoine and Marie Legraye.
Magnolia grandiflora, *conspicua*, and *speciosa.*
Philadelphus in variety.
Ligustrum ovalifolium and *foliis variegatis.*
Viburnum Opulus sterile, and *plicatum.*
Spiraea, Anthony Waterer, *Van Houttei*
Colutea arborescens.
Acacia in variety.
Ash, common and mountain.
Beech, common, copper, cut-leaved, and weeping.
Birch, Silver and purple-leaved.
Catalpa speciosa.
Cherry, double-flowering.
Crab, ornamental and flowering varieties.
Horse chestnut, and scarlet variety
Tulip tree.
Laburnum.
Oriental plane.
Lime, or linden.
Maple, Norway, Schwedlers, purple-leaved, and Canadian species.
Acer Negundo, *fol. var.*
Acer Negundo, *fol. aurea.*
Cedrus, *atlantica*, *atlantica glauca*, *Deodara.*
Scarlet oak, and other varieties.
Prunus Pissardii.
Thorn, white, pink, and scarlet (single and double).
Cornus, *florida* and *rosea.*
Willow, golden.
Ulmus campestris.
Halesia tetraptera.
Thuya (*Arbor Vitæ*), *occidentalis*, *orientalis elegantissimo.*
Box, Handsworth and golden varieties.
Abies Nordmanniana.
Abies nobilis.
Laurus nobilis (Sweet Bay).
Picea pungens Kosteri and *glauca*, *excelsa*, Common.
Pinus Laricio nigricans (*austriaca*).
Holly, Golden Queen, Silver Queen, *camelliafolia.*
Cupressus, *Lawsoniana*, *lutea*, Triumph of Boskoop.
Cupressus erecta, *erecta viridis.*
Retinospora pisifera, *pisifera aurea.*
Yew, English, Irish, golden, *elegantissima.*
Juniperus hibernica.

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BULBS.

All the bulbs were received here rather late in the autumn, and the ground was very wet when they were planted. In fact, some of the bulbs were planted after Christmas. This method did not seem to injure the bloom the following spring. The bloom on all varieties was almost perfection. The spring was cool and damp, thus prolonging the season of bloom to a greater extent than usual.

Three thousand early tulips (50 Darwin tulips, 250 May-flowering tulips, 50 double late tulips, 275 narcissi, 600 double daffodils, 500 single daffodils, 600 anemones, and 200 iris) were planted as per the following list and, without a single exception, made very excellent bloom:—

Early tulips—

Artus.
Cottage Maid.
Keizerskroon.
La Reine.
Proserpine.
Vermilion Brilliant.
Duchesse de Parma.
Imperator Rubrorum.
Chrysolora.
Joost Van Vondel, red.
Joost Van Vondel, white.
Pottebakker, scarlet.
Pottebakker, white.
Couronne d'Or.
Murillo.

Darwin tulips—

Extra fine mixed.

Single May-flowering tulips—

Gesneriana spathulata.
Isabella.
La Merveille.
Picotee.
La Candeur.

Double late tulips—

Yellow Rose.

Narcissus—

Barri Conspicuous.
Bicolor Victoria.
Golden Spur.
Incomparabilis Sir Watkin.
Incomparabilis Cynosure.
Incomparabilis Figaro.
Poeticus.
Bicolor Empress.
Emperor.
Princeps
Poeticus ornatus.

Double daffodils—

Albo pleno odorato.
Incomparabilis plenus.
Jonquilla plena.
Orange Phœnix.
Sulphur Phœnix.
Double Van Sion, extra selected.

Single daffodils—

Albicans.
Campernelle regulosus.
Campernelle.
Major.
Maximus.

Anemones—

Coronaria, single mixed.
Coronaria, double mixed.
Coronaria, St. Brigid.

Iris—

Hispanica, fine mixed.
Anglica, fine mixed.

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EXPERIMENT STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

WEATHER CONDITIONS.

The spring of 1913 was considered exceptionally backward, cold frosty nights continuing until the end of April. There was a frost on the night of June 5, and the frosts began again on September 6. But the months of October and November were exceptionally mild and favourable to harvesting operations.

The rainfall was about the average (9 inches) and came at most opportune times, saving much labour and time in irrigating. Rainfall in June on seven days, in July on nine days, in August on seven days, in September on four days, in October on five days and in November on three days. December was absolutely dry, there being neither rainfall nor snowfall.

Sleighing commenced on 21st of January, and it only lasted until the end of the first week in March.

HORTICULTURE.

Planting was commenced at this Station in April, 1913. The previous autumn a number of varieties of apple trees, tender fruit, and bush fruit from the Riverside nurseries and Ottawa had been heeled in, but owing to the transportation difficulties at that time of the year, many of the trees were somewhat injured and had to be discarded at the time of planting. When the railway communication by the branch line running south from Golden has been completed this difficulty will be obviated.

Five hundred and thirty-seven apple trees of various varieties have been planted in rows 30 feet by 15 feet apart. These were twice irrigated during the summer. Many of the trees have been winter-killed, but the hardier varieties which made a good growth last summer have stood the winter well.

One hundred and sixty-three tender fruits, consisting of cherries, pears, plums, and peaches, were planted. The majority made good summer growth but have since been winter-killed.

Bush fruits and small fruit were planted in April, 1913, in rows between the tender fruit trees. All have done well with the exception of the blackberries and some varieties of gooseberries. The Oregon Champion gooseberry was the only variety which made good growth.

Grape vines were planted but did not survive the winter.

Following are lists of the different fruits planted:—

Varieties Planted 1913.

Apples.—Cox's Orange Pippin, Duchess of Oldenburg, Delicious, Fameuse, Gravenstein, Grimes Golden, Jonathan, King, King David, Lowland Raspberry, McIntosh Red, Monmouth Pippin, Northern Spy, Ontario, Red Astrachan, Rome Beauty, Spitzenberg, Stayman Winesap, Wagener, Wealthy, Winter Banana, Yellow Transparent, Yellow Newtown, Anson, Bethel, Brock, Baxter, Bingo, Cobalt, Cromer, Charlamoff, Danville, Dudley, Excelsior, Granby, Glenton, Garner, Galetta, Homer, Herald, Kelso,

Lobo, Linton, La Victorie, Langford Beauty, Melville, Medford, Melba, Mendel, Milwaukee, McMahan, Niobe, Neville, Oswald, Okabena, Pinto, Prosper, Petrel, Percival, Quebec, Radnor, Rouleau, Rupert, Rochelle, Rosalie, Roger, Rufus, Severn, Stella, Sorel Seton, Scott Winter, Sonora, Thurso, Walton.

Crab Apples.—Hyslop, Transcendent.

Pears.—Bartlett, Beurre d'Anjou, Bosc, Clapp's Favourite, Comice, Flemish Beauty, Howell.

Plums.—Bradshaw, Burbank, Fellenberg, Greensborough Imperial Gage, Peach, Ponds Seedling, Royal Ann, Washington, Yellow Egg, Admiral Schley, Brackett, Voronesh Yellow, Yuteca.

Prune.—Italian.

Cherries.—Bing, Lambert, Montmorency, Olivet.

Peaches.—Belle of Georgia, Elberta.

Raspberries.—Cuthbert.

Blackberries.—Erie, Snyder.

Gooseberries.—Industry, Josselyn, Oregon Champion, Pearl.

Currants, Black.—Champion, Climax, Clipper, Collins Prolific, Eagle, Eclipse, Kerry, Naples, Topsy. *Red.*—Admirable Cherry, Cumberland, Fay's Prolific, Greenfield Red, Perfection, Red Cross, Red Dutch, Red Grape, Rankin Red, Victoria Red, Wilder. *White.*—Large White, White Cherry, White Grape.

ORCHARD EXPERIMENTS.

The following plots were laid out in the apple orchard to test the relative values of cropping, cultivating, and irrigating in regard to winter protection, soil moisture, and humus. When the plots are in working order it is the intention to test the amount of water used on each plot.

PLOT 1.—Irrigated when required; one late irrigation; clean cultivated.

PLOT 2.—Irrigated when required; cover crop to be sown alternate years.

PLOT 3.—Irrigate once only; clean cultivate each year.

PLOT 4.—Irrigate when required; clean cultivate; manure when necessary.

PLOT 5.—Irrigate when required; cover crop each year.

PLOT 6.—Irrigate when required; clover to be ploughed under and re-seeded alternate years.

PLOT 7.—Irrigate when required; clover to remain as long as plant is good then to be ploughed under and re-seeded.

PLOT 1, Rows 21, 22, 23.—Irrigated June 12, 1913. Clean cultivated.

PLOT 2, Rows 25, 26, 27.—Irrigated June 12, 1913. Trees 1, 2, 3, 4, rape sown July 1. Trees 5, 6, 7, vetches sown July 1.

PLOT 3, Rows 29, 30, 31.—Irrigated June 12, 1913. Clean cultivated.

PLOT 4, Rows 33, 34, 35.—Irrigated June 12, 1913. Clean cultivated.

PLOT 5a, Rows 37, 38, 39.—Irrigated June 13, 1913. Trees 1, 2, 3, 4, rape sown July 1. Trees 5, 6, 7, vetches sown July 1.

PLOT 5b, Rows 37, 38, 39.—Irrigated June 13, 1913. Rape sown August 5.

PLOT 6a, Rows 41, 42, 43.—Irrigated June 13, 1913. Trees 1 to 7, rape sown July 1.

PLOT 6b, Rows 41, 42, 43.—Irrigated June 13, 1913. Trees 8 to 19 rape sown August 5.

PLOT 7.—Irrigated June 14, 1913. Clover sown July 1.

VEGETABLES.

All of the vegetables were grown between the rows of tender fruit trees and were so arranged that the irrigation could be done by means of small ditches running the full length of each seed row. Only a portion of the land could be manured for the vegetables, and the difference between the good results obtained from those grown on manured land and the poor growth of those grown on unmanured land was very marked. A careful record was kept of the dates of irrigating. As the rainfall during the past summer came at concurrent period, with constant cultivation, one irrigation was found sufficient for all vegetables with the exception of cabbages and peas, which had two applications; next year it may be possible to keep more exact records of the actual amount of water used on each plot and to make test plots of different quantities used.

Forty varieties of potatoes were planted on manured land, and similarly treated as to irrigation and cultivation. Though the differences in weight at the time of harvesting were very marked, it would not be advisable to draw conclusions from the results of one year's trial. Tests are being made as to the time of ripening and their culinary value.

Marrows, cabbages, beans, and peas grown with manure, proved lucrative crops.

FLOWERS.

Many varieties of flower seeds were sown in the open in May, and the following gave very good results: Sweet Peas, Salpiglossis, *Dimorphotheca*, Pansies, Centaurea, Alyssum, Asters.

Many continued in bloom until late in October, and survived many of the earlier frosts. The pansies were wonderful, flowering the first year of seeding, continuing in bloom up to mid-November and flowering again soon after the snow left in March.

A large consignment of rose trees, together with apple trees from Daniel's, of Norwich, England, were mislaid en route to Kelowna and arrived here by mistake. They were planted on the north slope and bloomed during the months of August, September, and October.

The rose trees were banked up with soil during the winter but it is doubtful if many have survived the zero weather conditions.

BULBS.

A large consignment of bulbs received from Ottawa in October was planted on a bank facing north, where they were protected by snow during the winter.

The tulips were all in leaf at the end of March and promise to make a good show.

Scillas, hyacinths and daffodils planted in boxes in the basement flowered the whole of March.

EXPERIMENTAL STATION, SIDNEY, B.C.

REPORT OF S. SPENCER, FOREMAN MANAGER.

The fine weather during the past season brought many visitors from all parts of the world and every one seems to have been much pleased with the Station and its environment. The great amount of work that has been done is generally appreciated.

From October, 1912, to April, 1913, 50 acres were cleared, stoned, levelled, and ploughed. In the month of April the nursery land was drained and prepared to receive a large shipment of ornamental trees and shrubs from France, which were planted along with a good collection of native trees and shrubs, the majority of which made good growth during the season, and will be used mainly for ornamental purposes around the Station, and for testing their adaptability later on.

ANNUALS.

Seed of one hundred varieties of half-hardy annuals were sown in the hotbed. Every variety germinated and when planted out gave a grand display till the end of October, and during the fine summer weather were much admired by the visitors driving through the grounds, many inquiries being made regarding some of the varieties. *Salpiglossis, Nemesia, Dimorphotheca, Phlox Drummondii, Coreopsis atrosanguinea, and C. marmorata* were good, pretty, and persistent. Annuals and sweet peas were sown in the open ground and gave good results.

HERBACEOUS PERENNIALS.

Herbaceous perennials were sown in June, and 141 varieties germinated out of 171. They are making good stock.

In November, 1913, a collection of lilacs from Ottawa was planted in the nursery, and pæonies from France in the herbaceous plot. In September, shipments of *Iris germanica* and bulbs were received from Holland. Many of these have been planted in the border on the new lawns along the avenue.

The lawns have been seeded with Kentucky Blue grass seed.

VEGETABLES.

Vegetables for experimental work were sown in April. Peas, carrots, and beets did well. Tomatoes also ripened well. Some tomato plants were pruned and tied to stakes and others left unpruned and allowed to lie on the ground to ascertain which gave the more ripe fruit. Ten plants were planted in each system and the same attention was given in both cases. The tomatoes ripened on the same date under both methods, but of those pruned to single stems and tied to stakes, seven plants out of ten gave the most ripe fruits, besides giving a larger crop of green fruit. Cabbages and cauliflowers were planted on the side of the hill, but gave poor results, showing that this part of the Station is not the best situation for vegetables. In July and August, green aphis attacked them making them useless. Celery was pricked out in trenches but proved a failure, the hot dry weather killing it. Beans, corn, squash, cucumbers, and melons were sown during the second week in May. All did well. Peppers were slow in germinating and only commenced to bear when cold weather came. During the months of July and August the following were leaders in weight and usefulness:

Corn—Early Adams; Peas—Juno, Telephone, Heroine; Carrots—Half Long Chantenay; Lettuce—Improved Hanson and Allheart, for weight; Crisp as Ice (red) is good eating; Beans—Valentine and Wardell's Kidney Wax. In thinning experiments, the largest crop came from plots with the smaller distances. Parsnips at 4 inches did best, beets thinned to 4 inches grew very coarse. This year's experience in carrots, parsnips, salsify, long beets, show they do best with long distance thinning, whilst flat beets, garden turnips, onions do best with minimum distance.

The root maggots have been very destructive during the season in this district amongst cabbages, cauliflowers, onions, radishes, and turnips, but not on the Station. Our enemies have been green aphis and flea beetle but we kept the latter fairly controlled with Paris green mixture in dry form.

On May 1, potatoes received from Ottawa, Indian Head, Agassiz, and locally commenced to be planted, and were lifted on October 8. They were badly attacked by the flea beetle twice during the year. They only produced a light crop being planted on the slope of the hill. Those ready first were Dalmeny Hero, Factor, and Conquering Hero, one thing was learnt by the experiment, that the varieties from cold climates gave by far the best results over the Agassiz and local seed.

FRUITS.

Three varieties of strawberries were received from Ottawa and planted immediately, all lived and made good plants. One hundred and fifty-six plants, consisting of a number of varieties of red, black, and white currants, also raspberries, blackberries, and Loganberries, did well. In the shipment of gooseberries, fully 20 per cent failed. The Loganberries and Golden Queen raspberries were very fine. Tree fruits are being planted this winter and spring.

REPORTS OF EXPERIMENTS ON THE FRUIT FARM OF THOS. A. SHARPE, SALMON ARM, B.C.

The winter of 1912 and 1913 was normal, there having been no severe cold dips, and few stormy days. The lowest recorded temperature for the winter just past was 5° below zero F. on one night. Spring opened at about the usual date, but cool, dry, windy weather continued until early in June, and germination of grains and small seeds was delayed, and when they did sprout the lack of moisture and warmth retarded development.

In June the weather was warmer but continued rather dry for some time. When rains came the season was well advanced, and vegetables could not recover, and there has also been a light crop of fruit, said to be about 60 per cent of an average crop, and potatoes very light. As the writer's potatoes were planted on a clover sod, which had received a dressing of stable and hen manure in the previous spring, they started off well, and the luxuriant tops shaded and kept the land cool and fairly moist during the warm July and August weather, ensuring a very good yield.

Several additional varieties of apples, plums, and cherries, were planted in the spring, and with very few exceptions have made a satisfactory growth.

APPLES.

Twenty-three varieties of the apple trees first set out fruited this season. A number of these have fruited for three years, and some which in the moist climate at Agassiz were of a good average size have been rather disappointing, the fruit being too small for market, and if the fruit does not grow larger in the coming season some varieties will be taken out or top worked with other sorts. On the other hand, two or three new varieties have done very well and are promising as winter varieties.

SALMON ARM.

PEARS.

Dr. Jules Guyot, Flemish Beauty, and Bosc fruited. The first fruited freely and the fruit was large, very handsome, and of very fine quality. This variety is, I think, of value in this district. The other two varieties fruited for the first time this year, and the quality was very good and of fair size and appearance. Most of the other varieties have stood the climate and made a fair growth.

PLUMS.

Of the plums which have fruited, the Gueii and Primate are the most promising. The Gueii is a strong grower and a free producer, fruit of medium size, good appearance, and a good shipper. The Primate is above medium size, fine appearance and very superior quality. Both are mid-season.

DAMSONS.

The Shropshire damson, King of damsons, and Cluster damson are all good growers and very productive, and the fruit is in good demand at remunerative prices. Several other varieties tested will be taken out as too late for this district, or otherwise unsatisfactory.

CHERRIES.

Quite an addition has been made to our cherry orchard. The de Planchoury and Olivet produced heavily, and these varieties being medium late sorts and, coming on the market when it is pretty bare of cherries, command a ready sale at good prices, and a larger plantation of these two varieties may be made at an early date.

GRAPES.

There was a good crop of Saunders seedling this year, and they ripened well. No other variety set fruit well, a few open poor clusters was all the crop owing, perhaps, to the cold drying winds when they were in bloom.

All the small fruits were a success as the yield was good and prices satisfactory.

STRAWBERRIES.

In strawberries we have only two varieties, Magoon and Clark's seedling, both good croppers and good shippers, but neither early.

RASPBERRIES.

In raspberries we have three varieties fruiting and several which we hope to fruit this coming year; of all the many varieties of red raspberries so far tested the Cuthbert is perhaps the best for a general crop for shipping, being large, firm, and the canes hardy and productive.

LOGANBERRY.

The Loganberry is proving to be one of the most profitable of the small fruits for this valley as it is a heavy producer and a good seller.

SALMON ARM.

BLACKBERRIES.

Of the blackberries tested on this Farm, the Eldorado has been the most satisfactory, being hardy, a healthy, vigorous grower and an excellent producer. The berries are very large, sweet, and finely flavoured, and they hold their colour very well after picking.

RED CURRANTS.

Of the red currants tested, Perfection is one of the most satisfactory both as to vigour and productiveness of the canes and the size and quality of the currants.

WHITE CURRANTS.

I have not found a more satisfactory all-round white currant than the White Grape.

BLACK CURRANTS.

The new black currant, Boskoop Giant, has proved very satisfactory. The canes are vigorous and productive and the fruit large, sweet and very much milder in flavour than any of the other black currants which I have tested.

GOOSEBERRIES.

Downing and Josselyn are the most satisfactory for this district, being hardy, vigorous, productive, and free from mildew, and the fruit is of fair size and good in quality.

VEGETABLES.

Corn.—Several varieties of garden corn have been tested, and one of the earliest is the Malakoff. This variety grows very vigorously and produces ears ranging from 4 to 7 inches long, rather thick, with deep kernels which are white, sweet and good. Golden Bantam is a moderate grower, very productive of ears ranging from 3 to 5 or rarely 6 inches long, which are well filled out with golden yellow grains of very tender sweet corn of the finest quality and flavour. Cory, both red and white cob, are good varieties, as are some of the advertised sorts, but the Golden Bantam and Malakoff are decidedly the first choice of all so far tested. As this valley is warm enough to produce good table corn and a good market is found in Calgary, preparations are made to test several varieties in large quantities this coming year.

EXPERIMENTAL SUB-STATIONS.

FORT VERMILION, PEACE RIVER DISTRICT, ALBERTA.

This station is situated in the valley of the Peace river, in latitude 58° 36'. It is over 300 miles north of Edmonton, and is in charge of Mr. Robert Jones, who has prepared the following report:—

The early part of April was fine; the snow disappeared in the early part of the month, and the first wheat was sown on the 25th, after which date there was a sudden change to cold weather with snow flurries and severe freezing at night. May opened very cold and remained so for the first ten days, and there was little warmth in the ground before the 16th. The weather throughout the latter part of May was very fine and warm, with frequent showers which gave all plants in the garden a good start. From June 14 the weather, however, was very hot and dry until July 10, when there was rain. During this dry spell some things suffered badly and had to be watered. On the night of June 26, the temperature fell to 27·0° F., making 5° of frost, but most things that were injured, recovered. August was fine. September opened rainy and continued throughout the month. The first killing frost was on August 30, when the temperature fell to 28·2° F.

FRUITS.

APPLES.

Although no trees bloomed in 1913, most of the varieties being tested are doing well. These include the hybrid varieties originated by Dr. Wm. Saunders, and other Russian varieties and seedlings of which the condition is given below.

Cross Bred Apples.—Two Alberta doing fine; the top was cut back somewhat by the winter frosts. 2 Charles; these two are growing very well this summer. 1 Tony, doing well. 1 Prince, fine; the top of this one was cut down by the rabbits. 1 Golden; has done finely. 1 Magnus, doing finely this summer. 1 Silvia, doing well 1 Robin, very good. 1 Pioneer doing very well.

Seedlings of Cross Bred Apples.—Two Alberta seedlings, doing well. 1 Golden seedling, fine. 1 Jewel seedling, very good.. 1 Silvia seedling, has done very well.

Russian Apples and Russian Apple Seedlings.—One Varna, doing fairly well. 2 Charlamoff, very good. 1 Morden doing well.

PLUMS.

None in bloom this summer. 1 Cheney, good. 1 Bixby, doing finely. 1 Aitkin, made good growth. 1 Odegard, very good.

These are all of the older plum trees on the plot at present.

Raspberries have done well the Herbert and Heebner being two good ones under test. The first ripe berries of Herbert were gathered on August 4, and of Heebner on August 8.

Black currants were heavily loaded with fruit in 1913. Among the best are Kerry Eagle, Magnus, and Bang Up. They were ripe on August 4. Red and white currants are also doing well. Some of the most promising being Red Dutch, Greenfield, Long Bunched Holland, and Goliath among the red, and White Grape and White Kaiser among the white.

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ORNAMENTAL PLANTS.

Trees and Shrubs.—Many species and varieties of ornamental trees, shrubs, and herbaceous plants are under test. Caraganas, lilacs, bush honeysuckles, and spiræas are among the shrubs which bloom well. The varieties of the common lilac began to bloom on June 7, in 1913. *Syringa villosa* on June 20 and the Japanese lilac on June 30. Following is a statement of the condition of those tested with a few other notes in regard to them:—

Two *Acer tataricum Ginnala* are doing well. 2 *Acer saccharinum (dasycarpum)*; strong growth. 4 *Acer Negundo*, very good; these four are fully 11 feet high. 2 *Acer tataricum* doing well. 2 *Acer pictum* doing very well. 2 *Picea Excelsa Remontii*, very good. 2 *Amelanchier vulgaris*, very good; in bloom June 10, 1913. 1 *Betula alba laciniata* doing fine. 2 *Berberis Thunbergii* doing very well; in bloom June 12, 1913. 2 *Berberis sinensis* doing well; in bloom June 12. 1 *Clematis montana* doing very well. 2 *Caragana arborescens*; these two are doing very well; in bloom June 9, 1913. 2 *Caragana grandiflora* doing well, are quite large; in bloom June 7, 1913. 2 *Caragana frutescens* doing very finely; in bloom June 9. 1 *Caragana pygmæa* doing only fairly well, growth is slow; in bloom June 11, 1913. 2 *Cotoneaster tomentosa*; these are doing very well indeed; in bloom June 19, 1913. 1 *Crataegus Arnoldiana* doing well. 2 *Celtis occidentalis* doing well. 2 *Crataegus Carrieri* doing very well. 1 *Ceanothus americanus* doing finely. 1 *Lonicera alpina*, very good. 2 *Lonicera Mundeniensis* doing very well; in bloom June 4, 1913. 1 *Lonicera Fenzlei* doing very nicely; in bloom June 10. 2 *Lonicera tatarica virginalis alba*; these are very good. 1 *Diervilla lutea* doing well. 2 *Euonymus linearis* doing finely; in bloom June 16, 1913. 6 *Euonymus europaeus ovatus* doing well; in bloom June 9; *Hydranagea paniculata grandiflora* doing very well. 1 *Ligustrum amurenses*; very fine. 2 *Fraxinus pennsylvanica lanceolata* (green ash), just fairly well. 1 *Populus angustifolia*, medium only. *Lycium europaeum* have all died. 1 *Philadelphus Lemoinei*, Mont Blanc, doing very well. 1 *Pseudotsuga Douglasii*, Douglas fir; very fine. *Pinus sylvestris* (Scotch pine); very good. 1 *Spiræ Billardii*; very good; in bloom June 13, 1913; 1 *Picea pungens* (Blue spruce) doing very poorly. 2 *Pinus Strobus* (White pine); just medium. 2 *Quercus rubra* (Red oak) doing well. 2 *Quercus palustris* doing very well; in bloom June 16. *Rhamnus Frangula* have all died; I took the last one out this spring. 2 *Ribes aureum* (yellow-flowering currant); were killed down by the winter frost, but are sprouting again from the roots. 2 *Retinospora pisifera*; has done finely. 18 *Spiræa sorbifolia*; all of these are doing very well; all in bloom July 2, 1913. *Eleagnus angustifolia* (Russian olive); these have all died, they could not stand our winter. 6 *Betula alba* (White birch); only medium; these were killed back considerably by the winter frost but are doing fairly well now. 1 *Syringa amurensis* has done finely. 2 *Syringa japonica* (tree lilac); these two are quite large trees now; the winter does not hurt them whatever; they were in bloom June 30, 1913. 1 *Syringa vulgaris*, Madame Casimir Perier (lilac), doing very well; in bloom June 18, 1913. 1 *Syringa vulgaris*, Chas. Joly (lilac) doing very well; in bloom June 14, 1913. 1 *Syringa vulgaris*, Charles X (lilac); this one is very fine and large, has done very well; was in bloom June 10, 1913. 1 *Syringa vulgaris*, Michel Buchner (lilac); doing well; in bloom June 15, 1913. 2 *Syringa vulgaris*, Emile Lemoine (lilac), doing quite finely; in bloom June 7, 1913. 1 *Syringa vulgaris*, Jacques Calot (lilac), doing finely; in bloom June 18, 1913. 2 *Syringa vulgaris*, Mme. Abel Chatenay (lilac); these two are very good and have done well; were in bloom June 14, 1913. 1 *Syringa vulgaris*, Congo (lilac); has done very well; in bloom June 10, 1913. 1 lilac with no label; this one is doing very well and was in bloom June 10. 6 *Syringa villosa*, these six have done very well and are now quite large; all were in bloom June 20, 1913. 1 *Spiræa arguta*; this one is only medium, was killed back but is coming on now and is looking fine; will not

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bloom this year, I think. 6 *Salix Voronesh* (willow); these willows are doing finely and with a little work I can have a fine hedge and a fine windbreak. 2 *Thuya occidentalis* doing very well. 2 *Thuya occidentalis globosa*; very good. 2 *Thuya occidentalis Columbia*, only medium. 1 *Thuya accidentalis Hoveyi*, only fair. 2 *Viburnum molle*; these two have done remarkably well. Were in bloom June 3, 1913, and continued so for some time. 4 *Amelanchier* (June berries) doing well; in bloom May 31, 1913. Some fruit ripe on August 1, but very small. 1 *Rosa delicata* doing finely; in bloom July 2 and was in bloom on August 7, 1913. 1 *Rosa rugosa alba* doing well. 1 *Rosa rugosa* double, doing fine.

ANNUALS.

Annuals of many varieties made a great show. Pansies were in bloom on May 20, 1913, stocks on June 12, shirley poppy on June 30, petunias on July 2, pinks, July 4; zinnias, July 12; sweet peas, July 15; Phlox Drummondii, July 16; nasturtiums, July 16; asters, July 26. Many other sorts bloomed. The seed was sown in a hotbed on April 21 to 29 and transplanted to the open from May 29 to June 23

VEGETABLE TESTS.

All garden stuff did very well this summer in spite of the dry weather. Frost at the end of August overtook some of the beans before they ripened.

Asparagus—A good crop was obtained from the old beds of Columbia White fit for use May 26 to July 20; very good, fine and very large.

Rhubarb.—The old beds of Victoria or Giant, in use May 22 to September 20. Medium in size, tender and of good quality.

Celery—Seed sown under glass on April 24. The seed was very slow in germinating and in consequence it was not possible to transplant to the open until the 13th of June when the plants were yet quite small. Two rows 33 feet long of each of the following varieties were transplanted in trenches 16 inches deep, 6 inches of manure in bottom of the trench and about 5 inches of soil on top of the manure. The celery was watered quite frequently during the season. Two rows White Plume, in use August 6, medium in size, weight per dozen heads 19 pounds; two rows Golden Self Blanching, in use August 12, small, weight per dozen heads 15 pounds; two rows French Success, in use August 9, large and good, weight per dozen heads 20 pounds.

Onions—The following varieties of onions were sown in the garden on May 6, four rows, each row 42 feet long and 20 inches apart. A good deal of the seed did not germinate and was very thin in the row. The onions, only medium in size, were taken up on September 1. Large Red Wethersfield, in use July 4, yield from four rows, 51 pounds; Yellow Globe Danvers, in use July 7, yield from four rows, 49 pounds; New Early Yellow, in use July 14, yield from four rows, 30 pounds.

Beets—Two rows each of the following varieties—row 42 feet long and 20 inches apart. The seed was sown on May 6, all were inclined to go to seed and were somewhat woody, although they were kept cut down. This must have been caused by the drought. Pulled on September 6. Early Blood Red Turnip, in use July 14, yield from two rows, 133 pounds. New Meteor, in use July 12, yield from two rows, 145 pounds. Egyptian Dark Red Flat, in use July 8, yield from two rows, 157 pounds.

Carrots.—Six rows each of the following varieties, rows 42 feet long and 20 inches apart, seed sown on May 6: French Horn, in use July 14, pulled on September 4: after using all summer, 168 pounds of small carrots were dug. Half Long Chantenay, in use July 16, yield 172 pounds, medium in size.

FORT VERMILION.

Turnips.—Two rows each of the following varieties were sown on May 6th in rows 42 feet long and 24 inches apart. These did very poorly, being very small. Golden Ball, in use July 8. Early Red or Purple Top Strap Leaved, in use July 14.

Parsnips.—Four rows of Hollow Crown Parsnips were sown on May 8. These were a total failure as none of the seed germinated.

Squash, cucumber, and citron, as well as musk melons were a decided success this summer. The seed was planted on May 10 under glass with the same treatment as in 1912, the frames and glass being removed after all danger of frost was past.

Squash.—White Bush, in hills 6 feet apart each way, picked on August 23, thirty-nine large squash from the four hills, average weight 6 pounds. Summer Crookneck, picked on August 23, forty-six squash, medium in size, average weight 2¾ pounds. Early White Bush Scalloped, picked on August 30, thirty squash, medium in size, average weight 4 pounds. One hill of Hubbard, picked on August 30, nine squash, average weight 7 pounds. One hill of Mammoth Summer Crookneck, picked on August 23, six squash, large, average weight 10 pounds. One hill of Mammoth Whale, picked on August 30, eight squash, large, average weight 16 pounds. Four hills of English Vegetable Marrow, planted on May 8, picked on August 21, twenty-eight fine large marrow from the four hills, average weight 5½ pounds.

Tomatoes, Test of Varieties.—The tomato crop was reduced very much at the station owing to the extreme drought and by the young plants being set back somewhat by frost in June. The seed was sown in the hotbed on April 19 to 21, twenty plants each of the following varieties being transplanted on June 3 to the open ground: Alacrity (2-24-9), yield from twenty plants 48 pounds; 16 pounds of these were fully ripe when picked on September 1; medium in size. Alacrity (2-24-10), yield from twenty plants, 50 pounds; 20 pounds fully ripe; small in size. Langdon Earliana, yield from twenty plants 44 pounds; green when picked on September 1; small. Rennie's Earliest, yield from twenty plants, 51 pounds; 10 pounds of these were partly ripe on September 1; medium in size.

Beans, Varieties Tested.—Of the seven varieties tested five escaped the frost; these five, I think, will be fit for seed. Wardwell's Kidney Wax; in use July, pulled August 30, large pods. Challenge Black Wax, in use July 28; pulled August 30; large pods. Golden Wax, in use July 25; pulled August 30; medium pods. Dwarf Black Wax, in use August 1, pulled August 30; small pods. Kentucky Wonder or Old Homestead, in use August 3; pulled August 30; quite green. Keeney's Rustless Wax, none fit for use; frozen. Extra Early Valentine, none fit for use; frozen.

Cucumbers.—Four hills of the following varieties of cucumbers were sown on May 8; they had the same treatment as the squash and did very well. New Century, fit for use August 1, all picked on August 23; seventeen picked; large, length about 6 inches. Early Fortune, fit for use on August 4; twenty-one picked on August 30; large. Extra Early White Spine, fit for use on July 28; twenty-two picked on August 30; medium in size.

Muskmelon.—One hill of Hackensack seed sown on May 8, under glass; four melons picked on August 23; small in size, half pound each; not ripe.

Lettuce.—One row each of the following varieties of lettuce were sown on May 5: Grand Rapids, in use June 7; very good, medium heads. Iceberg, in use June 2; good heads. The Maise, in use June 5; very fine, medium heads. Salamander, in use May 31; fair size. Crisp as Ice, in use June 3; extra large, very fine and crisp.

Radish.—One row each of the following varieties of radish were tested; seed sown on May 5: Early French Breakfast, in use June 5. Turnip Early Scarlet White

Tipped, in use June 2. Forcing Turnip Scarlet, in use May 31. Boston Market Olive Shaped, in use June 5.

Garden Peas.—Seed was sown in drill: 2½ feet apart and 30 feet long. The following varieties were sown May 12: Witham Wonder, length of vine, 19 inches; in use July 12; crop very good; length of pod, 3½ inches; quality good. Stratagem, length of vine 15 inches, in use July 15; crop medium; length of pod, 3 inches; quality fair. Admiral Dewey, length of vine, 42 inches; in use July 19; crop heavy; length of pod, 3½ inches; quality good. Henderson's First of All, length of vine, 24 inches; in use July 9; crop medium; length of pod, 2 inches; quality good. Gradus, length of vine, 20 inches; in use July 7; crop good; length of pod, 2¾ inches; quality medium. Gregory's Surprise, length of vine, 18 inches; in use July 10; crop good; length of pod, 2½ inches; quality good. American Wonder, length of vine, 28 inches; in use July 19; crop fair; length of pod, 3 inches; quality medium. Dwarf Telephone, length of vine, 16 inches; in use July 24; crop good; length of pod, 3¾ inches; quality good. Premium Gem, length of vine, 24 inches; in use July 22; crop fair; length of pod, 2¾ inches; quality medium. All peas in bloom from June 16 to June 30.

Cabbage.—The first sowing was made April 19 in the hotbed, transplanting into the open ground from May 23 to May 30. The following varieties were tested with very good results: Danish Round Head, in use August 30; average weight, 11 pounds; large, solid. Early Winningstadt, in use September 1; average weight, 6½ pounds; medium, solid. Copenhagen Market, in use September 6; average weight, 6¾ pounds; extra large, solid. Large Brunswick Short Stem, in use September 4; average weight, 9 pounds; large, solid. Extra Amager Danish Ballhead, in use August 6; average weight, 9 pounds; large, solid. Danish Summer Ballhead, in use August 21; average weight, 7½ pounds; medium, solid.

Cauliflower.—The seed was sown in hotbeds on April 21, and transplanted to the open ground May 30. The heads were somewhat smaller than usual on account of the very hot and dry weather we had. Although small, the heads were firm and very good. Extra Early Dwarf Erfurt, in use July 19; average weight, 7½ pounds, quality good. Snowball in use July 25; average weight, 6¼ pounds; quality fine.

Experiments with Potatoes.—Five varieties of potatoes were planted on the 24th of April in plots of one-thirtieth of an acre in drills 30 inches apart and 12 inches apart in the drills. After the crop was up the ground was harrowed and frequent cultivation given during the season. The potatoes were taken up on the 18th and 20th of September and were quite large, although the yield was somewhat low. All were fit for use by the 26th of July. The following were the yields obtained: Rochester Rose, planted April 24, lifted September 18; growth, strong; size, large; yield per acre, 404 bushels; form, oval; colour, red. Gold Coin, planted April 24, lifted September 18; growth, strong; size, large; yield per acre, 385 bushels; form, oval; colour, white. Carman No. 1, planted April 24, lifted September 20; growth, strong; size, large; yield per acre, 360 bushels; form, oval; colour, white. Early Rose, planted April 24, lifted September 20; growth, medium; size, medium; yield per acre, 339 bushels; form, oval; colour, red. Irish Cobbler, planted April 24, lifted September 20; growth, medium; size, medium; yield per acre, 308 bushels, 30 pounds; form, round; colour, white.

Received on June 2, 1913, 5 pounds of Gold Coin potatoes from G. H. Hutton, Superintendent Lacombe Experimental Station; planted June 3 in three rows each 22 feet long; fit for use August 11; dug September 24: 121 pounds obtained, quite large.

FORT VERMILION.

GROUARD, LESSER SLAVE LAKE, ALBERTA.

The following report has been prepared by Brother Laurent, O.M.I., the mission with which he is connected having charge of the work at Grouard.

About the middle of October, 1912, the experimental plots were manured, and the manure immediately worked in through ploughing and harrowing.

One of the plots, a heavy clay one, intended for the growing of late varieties of cabbage, was not harrowed in the fall.

Plots for fall seeding have been thoroughly worked and sown from the 18th to the 21st of October.

Five varieties of onions and as many varieties of carrots were sown in the fall of 1912; also a plot of parsnips.

About the first day of May, 1913, fifteen days after snow had disappeared from the surface of the ground, every seedling came up and kept in good condition, not being damaged by the late spring frosts or the heavy winds which blew very strong up to the 6th of June.

Check plots were sown also in the spring, about the end of April.

After June 15, the rainfall being heavy enough, hotbed plants, cabbages, cauliflowers, celery, tomatoes, squashes and cucumbers sown on the 15th of April were transplanted in the open ground.

Varieties of Vegetables sown in Hothouses.

Cabbages.—Paris Early Market, Early Jersey Wakefield, Henderson's Succession, Quintal d'Alsace de Schweinfurt, Etampes, Bonsecours Market, Cannon Ball.

Cauliflowers.—Snowball, Gilt Edge, Lenormand, Improved Maltais.

On the 18th of July, some cabbages were good for the table, while cauliflowers were harvested first about the end of the same month. Specimens weighing 45 pounds were found among the Schweinfurt variety, and Bonsecours Market gave some of 35 pounds.

Tomatoes.—Sparks' Earliana (our own seed), Matchless, Dominion Day, Red June. The Earliana variety was first to ripen on August 15 and the Matchless came second on the 20th of same month, with some fruits of more than 1 pound. Two hundred plants of tomatoes were set that gave 12 bushels of fruit, the half of which were ripe, on the 7th of September.

Celery.—Paris Golden Yellow, White Plume, both good varieties and very good yielders.

Squashes.—Boston Marrow, Long Green English Vegetable Marrow, Potiron Mammoth, Potiron jaune de Paris. Sown in hotbeds on the 15th of April and set in the field on the 7th of June. The Mammoth variety produced fine fruits from 35 to 44 pounds each, while the fruits from the English Vegetable Marrow weighed 18 to 22 pounds. Harvested on the 6th of September.

Sown in soil at the end of April and during first ten days of May.

Carrots.—Chantenay, Guerande, Danvers, Improved Half Long, White Vosges (fit for fodder). Crop very good.

Beets for Table.—Crosby's Egyptian, Egyptian Turnip, Witham-fireball.

Butter Beans.—Wardwell's Kidney Wax, Davis Wax, Market Wonder. Fair crop.

Grouard.

Garden Peas.—Alaska, Thomas Laxton, Sutton's Excelsior. Very good crop of excellent peas, the first variety named being ready for the table on the 1st of July.

Turnips for the Table.—Extra Early Milan, Early Stone. Both good and early varieties.

Lettuce.—Large Boston, May King, Nonpareil. Did very well.

Onions.—Large Red Wethersfield, Yellow Globe Danvers, Early Flat Red, Barletta. On account of the season being too wet, none ripened and every variety was attacked by onion worms.

Table Corn.—Early Malakoff, Golden Bantam. The first variety only ripened.

Radish.—A good crop.

Rhubarb.—Victoria. Good crop.

Flowers.

During the first week of April were sown in hotbed: Asters, 8 varieties; stock, 4 varieties; godetia, 4 varieties; Gueules de Lion, mixed; alyssum and verbena; dianthus, 2 varieties; *Dianthus sinensis.* All were planted in the garden during the first week of June and kept well in flower up to the 13th of October. More than fifty varieties of flowers were tried and gave satisfaction; also, a dozen of perennials.

Ornamental Shrubs.

Common lilacs and *Syringa villosa* gave profusion of flowers from the 15th of June to the 20th of July, as did the Tartarian honeysuckle.

Currants and large strawberries gave a good crop.

On account of the season being exceptionally wet and cold, some plants suffered to a certain extent, but the results of these species and varieties, on the whole, were satisfactory.

GRANDE PRAIRIE, ALTA.

Some experiments with varieties were made on the farm of Mr. S. J. Webb, Beaver Lodge, Grande Prairie, Alta., who reports as follows:—

The spring opened early. Seeding started April 12. On the 20th there was a fall of snow which delayed the seeding somewhat, but taking it altogether it was a favourable spring with plenty of moisture for germination of seeds. It was a wet season all through. Potatoes and all kinds of vegetables were an excellent crop.

Vegetables.

Garden Peas.—Thomas Laxton, sown April 25; in use July 10; ripe September 1. Sutton's Excelsior, sown April 25; in use July 20; ripe September 1.

Beets.—Crosby's Early Egyptian, sown April 25; in use July 15. Egyptian Turnip, sown April 25; in use July 15; Witham Fireball, sown April 25; in use July 15; good yield.

Carrots.—Early Scarlet Horn, sown April 25. Improved Half Long Danvers, sown April 25; very large yield.

Lettuce.—Sown in open, April 25: May King, fit for use May 20. Big Boston, fit for use May 20.

Grande Prairie.

Onions.—Extra Early Red Wethersfield, sown April 25; good yield. Danver's Yellow Globe, sown April 25; fair. Early White Barletta, sown April 25; small.

Beans.—Three varieties were sown but were killed with frost the latter part of June.

Potatoes.—Thirty pounds of Wee McGregor potato were planted and yielded 510 pounds.

Flowers.

Sweet Peas, sown in open April 28, in bloom June 30; very fine; in bloom till frost. *Verbena hybrida*, sown in open May 15; in bloom August 1; very good. *Portulaca grandiflora*, sown in open May 15; in bloom August 1; very good.

Poppy, Shirley, sown in open May 15; in bloom July 10; bloomed freely.

Poppy, Snowdrift, sown in open May 15; in bloom July 20; in bloom till frost.

Poppy, Iceland, sown in open May 15; in bloom from July 4 till frost.

Poppy, Oriental, sown in open May 15; in bloom from July 4 till frost.

Nasturtium, Spitfire, sown in open June 1; in bloom from August 18; very good.

Nasturtium, King of Tom Thumbs, sown in open June 1; in bloom from August 7; bloomed freely.

Nasturtium, Golden Queen, sown in open June 1; in bloom from August 7 till frost.

Pansies, sown in open May 15; in bloom from June 30; very fine.

Candytuft, sown in open May 15; in bloom from June 30.

Mignonette, sown in open May 15; in bloom from July 5; good.

FORT RESOLUTION, McKENZIE DISTRICT.

This Station is situated on Great Slave lake in latitude 61°, and the report is made by Rev. Father A. Duport.

The seeds were sown towards the middle of May under good conditions, as the soil was moist, but as the new soil is formed of old sod and dead wood it suffers too much from drought. On this account many of the seeds did not grow. Furthermore, the latter part of May and all the month of June were exceptionally cold. On June 25, everything was struck by a severe frost, the cabbage, the peas, and the turnips suffering particularly. Towards the end of July and beginning of August there was abundant rain, but it came a little too late. These observations explain the poor results for 1913. Some of the details of the results follow:—

VEGETABLES.

Variety.	Received from.	Quantity planted.	Date of Planting.	Germinated.	Result.
Beans.					
Refugee	Ottawa	1 sample	June 1	Did not germinate	
Early Red Valentine	"	"	" 1	"	
Wardwell's Kidney Wax	"	"	" 1	June 28	Did not ripen and were eaten green in September.
Challenge Black Wax	"	"	" 1	" 30	
Hodson long podded	"	"	" 1	" 30	
Potatoes.					
Reeves' Rose	Laeombe)	2½ lb.	June 1	July 2	Sept. 18, 17 lb.
Rochester Rose	"	1¼ "	" 1	" 2	" 18, 16 "
Vick's Ex. Early	"	1¼ "	" 1	" 2	" 18, 12 "
Early Rose	From last year's crop	3 "	May 24	June 25	" 18, 50 "
Carrots.					
Danvers half long. Potter Marshall	Edmonton, Alta	3 samples	May 10	May 29	Ready for use, Sept. 15. Weight, 120 lb.
Beets.					
Eclipse	Edmonton, Alta	"	May 10	Did not germinate	
Half Long Blood	"	"	" 10	"	
Peas.					
Gregory's Surprise		4 lb. May	17 May 28		Ready for use, Sept. 10.
Caractacus	Vilmorin	1 sample	June 14	June 30	" "
Turnips.					
Early Snowball	Edmonton, Alta	3 samples.	May 17	June 28	Ready for use Aug. 15
Ruta baga purple top	"	8 "	" 17	July 30	Grew too slowly, the result being only leaves.
Onions.					
Extra Early Red	Edmonton, Alta	1 sample	May 4	May 26	No result.
Cabbage.					
Early Winningstadt	Edmonton, Alta	1 sample.	May 4	May 26	Frozen June 25. Some grew again and were very nice.
Cauliflower.					
Early Favorite	Edmonton, Alta	1 sample.	May 4	May 22	

FORT RESOLUTION.

FLOWERS.

Asters, mixed; sown in April in greenhouse; in full bloom in September. Stocks, planted in greenhouse in April; did not bloom. Coreopsis, planted outside in May; in full bloom in August. Gaillardia, planted outside in May; in full bloom in September. Sweet Alyssum, planted outside in May; in full bloom in August. Mignonette, planted outside in May; in full bloom in August. Pansy, planted outside in May; in full bloom in August. Helichrysum, planted outside in May; did not bloom. Acroclinium, planted outside in May; did not bloom. Balsam, planted outside in May; in full bloom in August.

FORT PROVIDENCE, McKENZIE DISTRICT.

This station is situated near Great Slave lake on the Mackenzie river, between latitude 61° and 62°, and the report is made by Rev. Father C. H. Giroux.

The season of 1913 was not favourable, for there was no rain except on June 10, and not a drop for the rest of the summer. There was also a severe frost on July 8. Following is a report on the results from the vegetables tested:—

Variety.	Planted.	Ready for use.	Harvest.	Quality.
Lettuce.				
Cos Trianon	May 13	June 26	Magnificent.	
Red Edged Victoria	" 13	" 28	"	
Cabbage.				
Early Jersey Wakefield	Mar. 12	May 13	Sept. 27	Very common.
Amager Danish	" 12	" 13	" 27	"
Tomato.				
Sparks' Earliana	Mar. 12	May 13	Sept. 3	Green.
Beets.				
Early Blood	May 14		Sept. 13	Medium.
Egyptian Dark	" 14		" 13	
Corn.				
Early Malakoff	May 13		No ears formed.	
Carrots.				
Half Long Chantenay	May 13		Sept. 13	Medium.
French Horn	" 13		" 13	"
Radish.				
Turnip Early Scarlet	May 13	June 22		
Forcing Turnip	" 13	" 22		
Turnips.				
Early White	May 20	Aug. 15	The largest head weighed 6½ lb.	

The autumn frosts commenced September 5, after which there was nice weather, but it froze up hard on the 22nd. The beginning of October the ground was covered with snow.

FORT MCKENZIE.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT

FROM

THE CEREAL DIVISION

FOR THE

Fiscal Year Ending March 31, 1914

PREPARED BY

Dominion Cerealist, Ottawa, Ont. - - - - - - - - - Chas. E. Saunders, B.A., Ph.D.
Superintendent—
Experimental Station, Charlottetown, P.E.I. - - - J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S. - - - - - - - W. W. Baird, B.S.A.
Experimental Station, Ste. Anne de la Pocatière. - - Joseph Bégin.
Experimental Station, Cap Rouge, P.Q. - - - - - Gus. A. Langelier.
Experimental Farm, Brandon, Man. - - - - - - W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask. - - - - - T. J. Harrison, B.S.A.
Experimental Station, Rosthern, Sask. - - - - - Wm. A. Munro, B.A., B.S.A.
Experimental Station, Scott, Sask. - - - - - - R. E. Everest, B.S.A.
Experimental Station, Lethbridge, Alta. - - - - - W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta. - - - - - G. H. Hutton, B.S.A.
Experimentalist, St. Bernard Mission, Grouard, Alta. - Rev. Bro. Laurent.
Experimentalist, Grand Prairie, Alta. - - - - - - S. J. Webb.
Experimentalist, Fort Vermilion, Alta. - - - - - - Robert Jones.
Experimentalist, Fort Resolution, Mackenzie Dist.
Experimentalist, Fort Providence, Mackenzie Dist.
Experimental Farm, Agassiz, B.C. - - - - - - - P. H. Moore, B.S.A.
Experimental Station, Sidney, B.C. - - - - - - - Samuel Spencer.

REPORT OF THE DOMINION CEREALIST

Ottawa, March 31, 1914.

J. H. Grisdale, Esq., B.Agr.,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the eleventh annual report of the Cereal Division. This report gives a brief review of some of the more important investigations carried on and results obtained during the past twelve months.

The past season was decidedly more favourable for cereals than the year previous. Crops on the whole were very good, and although there were disadvantageous features in the weather in some parts of the country, there were no large areas of failure from any cause. At Ottawa, in spite of prolonged summer drought, the crops on the Cereal Division fields (all of which were sown fairly early in spring) were good both in quality and quantity. It is doubtful whether spring wheat equal in quality to that of 1913 has ever before been produced in the Ottawa valley.

There have been some changes in my staff during the past twelve months. My assistant, Mr. R. Newton, B.S.A., resigned his position at the end of January to take up important agricultural work in the province of New Brunswick. Though he had been attached to the Cereal Division for a little less than a year, he had already proved himself a very valuable assistant, whose place it will not be easy to fill.

A new assistant, specially for milling and baking work, was appointed in July. Mr. R. W. Nichols, who was selected for this position, was trained in some of the best research laboratories in Ireland and the United States, and had acquired experience in Canada also. He is a valuable addition to my staff.

My stenographer resigned early in the fiscal year and her place has been most satisfactorily filled by Miss Mary C. Carter.

I wish to thank all the members of my staff for their good work and loyalty. In addition to those already mentioned, I should refer particularly to my foreman, Mr. Geo. J. Fixter, who has charge of the field work and of the seed distribution; and also to Mr. Wm. T. Ellis, who has been responsible for the vitality tests of the samples of grain referred to him. I appreciate the fact that much of the success of the work of this Division is due to the careful and conscientious labours of my regular workmen.

The results obtained at the various branch Farms and Stations will be found reported upon by the officers in charge, in the pages following my own report, which naturally deals chiefly with the work at Ottawa.

I have the honour to be, sir,
Your obedient servant,

CHARLES E. SAUNDERS,
Dominion Cerealist.

CORRESPONDENCE.

The correspondence carried on by the Cereal Division is very heavy. Most of it comes in the winter months and is connected with the distribution of seed grain. Some idea of the extent of this work may be gathered from the following figures:—

Letters received direct	13,131
Letters received through other offices (estimated)	6,500
Letters despatched, English	3,505
Letters despatched, French (estimated)	800
Printed letters and circulars despatched (English and French)	27,916
The estimated totals are therefore:—	
Letters received	19,631
Letters and circulars despatched	32,221

In explanation of the above, it should be stated that while the records of the in-coming and out-going letters, etc., are accurate, an exact account of the letters transferred to this office from the other offices on the Central Farm is not available.

In order to reduce as much as possible the number of typewritten letters, printed replies are kept on hand, by means of which many hundreds of inquiries are answered every year. These are classified above along with the circulars, though they might fairly have been counted with the letters.

VISITS TO BRANCH FARMS AND STATIONS.

The regular annual visits were paid to the branch Experimental Farms and Stations, those in the west being visited in June and July, and those in the east in August and September. The latter part of July and the early part of August were spent at Ottawa as usual. There is a great deal of very important work in the selection of plants to be done at that period, and it has seemed advisable thus far for the Dominion Cerealist to keep this work entirely in his own hands.

On the western trip, in addition to the older Farms and Stations, a visit was paid to the new station at Sidney, B.C. Arrangements have been made to carry on experiments there in autumn-sown varieties of cereals which cannot be depended upon to succeed regularly at any of the other locations.

On the eastern journey, the new stations at Kentville, N.S., and Fredericton, N.B., and Ste. Anne de la Pocatière, Que., were visited for the first time. It is proposed to carry on variety tests of cereals in a limited way, and the growing of seed grain for sale, at each of these stations.

MARQUIS WHEAT.

For the third time in succession, Marquis wheat has won the highest award in international competitions. Last autumn at the International Dry Farming Congress at Tulsa, Oklahoma, the first prize was given to an exhibit of Marquis wheat grown by Mr. Paul Gerlach of Allan, Sask.

It is certainly a noteworthy record for any variety of wheat to gain three such awards as have now been won by Marquis in the last three years; and in view of these successes it is not too much to claim that this variety is the most remarkable wheat known in North America. Many requests for samples of Marquis reach us from foreign countries, from farmers and scientific agriculturists who have heard of its high rank on this continent.

OTTAWA.

PRELUDE WHEAT.

The reports received from the farmers to whom samples of Prelude wheat were sent last spring show that this new variety will be of great value over large areas of country, on account of its extreme earliness in ripening. Its peculiar characteristics must, however, be taken into consideration whenever it is sown. Owing to the rapidity with which it grows during the early part of the season, it cannot withstand drought at that time so well as the later-maturing varieties, the progress of which can be delayed by drought without serious consequences. It is possible that late sowing of Prelude wheat may be advisable in some instances, if by such a procedure one can be reasonably certain to avoid a long early drought, and place the seed in the soil shortly before a period of fair rainfall. Some complaints of the shelling out of Prelude wheat when allowed to stand until quite ripe, indicate the necessity of cutting this variety before it reaches full maturity. This will make the average date of cutting, in central Alberta and Saskatchewan, very early in August, or possibly sometimes even at the end of July. At Ottawa, Prelude is usually ready to cut about ten days before the end of July.

PIONEER WHEAT.

It has appeared necessary to name and introduce another new variety of wheat to meet certain special requirements in portions of Saskatchewan and Alberta. The cross-bred variety hitherto known as 195 F has been named Pioneer. This wheat resembles Prelude in some respects, but has shown considerable ability to resist drought. Last season it gave excellent results at the Experimental Station at Lethbridge, both on non-irrigated and irrigated land. It is recommended for trial in localities where a very early-ripening variety is needed, and where the rainfall is not sufficient to ensure success with Prelude.

Pioneer is a selection from the progeny of a cross made in 1903 by the Dominion Cerealist between Riga and Preston wheats. In earliness the new variety stands between the two parents, or it may be described as ripening about midway between Prelude and Marquis. Pioneer is bearded and has smooth chaff. The straw is of fair length, rather long for so early a wheat, and though not of very great strength it appears to be quite strong enough for the districts for which it is recommended. Pioneer should not be sown in any locality where the tendency is towards long straw. Under such conditions, the straw of this variety would probably be too long and weak. Furthermore, Pioneer is liable to rust and other diseases in moderately moist climates.

The kernels of Pioneer are red and of exceptional hardness and high weight per bushel. The flour obtained from it is of excellent colour and very high baking strength.

Pioneer has been tested for some years at Ottawa and on some of the branch Farms. This spring a few samples have been distributed to farmers in Alberta and Saskatchewan. It is not expected that this wheat will be of value in the most famous spring wheat areas, but it will probably serve a very good purpose in some sections for which there has been no suitable sort up to the present time.

Farmers who require an earlier variety than Marquis and who find Prelude too short in the straw should write for a free sample of Pioneer.

DISTRIBUTION OF SAMPLES OF SEED GRAIN AND POTATOES.

The annual distribution has been carried on as usual during the past winter. A good stock of grain of superior quality was on hand, the seed of most varieties having been grown at Indian Head, Sask., and Brandon, Man. Some Prelude wheat was

obtained from the Experimental Station at Lacombe, Alberta; and the Station at Cap Rouge, Que., supplied some Huron wheat and Arthur peas. The crops raised on the Central Farm were drawn on for occasional samples of varieties not usually sent out. The potatoes for distribution were grown on the Central Farm.

Owing to the destruction of the large barn at Ottawa last autumn by fire, about 1,000 bushels of the purest selected Banner oats we have ever had were lost. This prevented us from making as large and useful a distribution of oats as had been planned.

As compared with last year the total number of samples distributed shows an increase of nearly one thousand, due chiefly to the greater number of samples of potatoes sent to Ontario and Quebec, and the greater number of samples of peas sent to several of the provinces.

It is a pleasure to record the fact that there is an improvement in the quality of the applications received; but some applicants do not yet realize that thoughtful statements of their needs and experience, and of their conditions of soil and climate are required. Without such statements it is frequently impossible for the Dominion Cerealist to choose a suitable variety to send. As usual, many applications were received too late.

Farmers who desire to secure samples from this free distribution should apply not later than January, and preferably in December; and to avoid delay must give a clear statement of their needs so that a suitable variety may be sent without further correspondence. Applicants for potatoes from other provinces than Ontario and Quebec are supplied from the branch Experimental Farms.

The following tables show the number of samples distributed from Ottawa:—

DISTRIBUTION—Classified by Varieties.

Name of Variety.	Number of Packages	Name of Variety.	Number of Packages
Oats—		Spring Rye—	
Banner	504	Common	1
Ligowo	481	Spring Wheat—	
Daubeney	187	Marquis	1,223
Abundance	25	Prelude	697
Eighty Day	18	Huron	298
Gold Rain	2	Red Fife	171
	1,217	Early Red Fife	16
		Pioneer	12
Barley (six-row)—			2,417
Manchurian	955		
Success	51	Peas—	
O. A. C. No. 21	39	Arthur	2,015
Barley (two-row)		Potatoes—	
Canadian Thorpe	39	Gold Coin	968
Early Chevalier	1	Carman No. 1	655
Gold	1	Irish Cobbler	528
	1,086	Rochester Rose	351
			2,502

DISTRIBUTION—Classified by Provinces.

	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia	Total.
Oats	14	64	52	409	187	34	228	194	35	1,217
Barley	3	56	20	322	154	84	256	160	31	1,086
Wheat	7	91	35	378	190	153	921	575	67	2,417
Peas	10	82	64	684	317	117	346	312	83	2,015
Rye				1						1
Potatoes				1,368	1,134					2,502
Total	34	293	171	3,162	1,982	388	1,751	1,241	216	9,283

SALE OF SEED GRAIN.

The Dominion Cerealist will be glad to furnish information, as far as possible, to intending purchasers of seed grain, as to the nearest source of supply for good seed. Seedsmen and farmers in any part of Canada having seed grain for sale are advised to send their names, with statements as to quantities, etc., and samples of the seed offered, to the Dominion Cerealist.

Most of the branch Experimental Farms have seed grain for sale, usually in limited quantity. There is also frequently a small surplus of seed at Ottawa after the free distribution has been finished, which is available for sale. As a rule not more than two bushels of any variety can be sold from the Central Farm to one purchaser.

TESTS OF VITALITY OF SEED GRAIN GROWN IN 1913 AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, AND AT THE BRANCH EXPERIMENTAL FARMS.

The following table, prepared by Mr. Wm. T. Ellis, gives the results of the germination tests of the seed grain produced at the various Experimental Farms in 1913:—

CENTRAL EXPERIMENTAL FARM, OTTAWA.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Average Percentage of Weak Growth.	Average Percentage of Strong Growth.	Average Total Vitality.
Wheat	180	100	47	90·0	2·9	93·0
Barley	177	100	11	82·6	4·1	86·7
Oats	46	99	50	74·1	8·4	82·5
Flax	24	49	20			38·0

CHARLOTTETOWN, P.E.I.

Wheat	14	91	43	71·9	3·5	75·5
Barley	19	99	79	91·5	1·5	93·1
Oats	21	100	79	89	2·4	91·4
Peas	3	70	50			59·3

OTTAWA.

TESTS OF VITALITY OF SEED GRAIN, ETC.—*Continued.*

NAPPAN, N.S.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Average Per-centage of Strong Growth.	Average Per-centage of Weak Growth.	Average Total Vitality.
Wheat	11	93	70	81·6	4·1	85·8
Barley	12	100	84	92·3	2·3	94·6
Oats	12	100	91	94·5	4·0	98 5

BRANDON, MAN.

Wheat	23	95	72	80·7	3·8	84·6
Barley	17	100	77	88·4	3·7	92·1
Oats	18	99	86	88·6	4·9	93 5
Peas	10	94	50	.....	.....	75·4

INDIAN HEAD, SASK.

Wheat	33	100	81	88·3	3·6	91·9
Barley	25	100	90	95·9	1·5	97·4
Oats	18	100	88	95·3	2·0	97·3
Peas	11	98	76	.....	.....	89·8

ROSTHERN, SASK.

Wheat	19	100	83	93·1	1·9	95·0
Barley	13	100	43	92·1	1·9	94·0
Oats	11	100	94	95·7	1·9	97·6
Peas	11	92	54	.....	.....	71·6

SCOTT, SASK.

Wheat	12	96	72	86·5	2·4	88·9
Barley	6	99	88	91·5	2·3	93·8
Oats	11	95	70	78·8	7·2	86·0
Peas	5	90	2	.....	.....	59·6
Rye	2	74	72	.....	.....	73·0
Buckwheat	4	63	26	.....	.....	46·0
Mustard	4	78	27	.....	.....	53·5

FORT VERMILION, ALTA.

Wheat	9	100	97	98	·8	98·8
Barley	6	100	97	·98	1·1	99·1
Oats	5	98	94	96·4	·6	97·0
Peas	1	.....	.....	.....	.....	92·0

LETHBRIDGE, ALTA.

Wheat	35	96	77	84·7	3·4	88·1
Barley	22	100	81	90·8	2·7	93·5
Oats	17	97	75	79	7·9	87·0
Peas	20	100	58	.....	.....	86·9

MILLING AND BAKING TESTS.

Milling and baking tests have been conducted during the past winter on a larger scale than before, as there is now a special assistant who was appointed to take charge of this work. In addition to variety tests a considerable amount of work was done in studying baking methods, for experimental, commercial, and household purposes.

The following summary will give an idea of the extent of these tests:—

Milling Tests

Named varieties grown at Ottawa in 1913	21
Numbered varieties grown at Ottawa in 1913	159
Varieties grown at branch Experimental Farms in 1913	50
Samples received from farmers	3
Total	233

Baking Tests.

Named varieties grown at Ottawa in 1913	21
Numbered varieties grown at Ottawa in 1913	159
Varieties grown at branch Experimental Farms in 1913	50
Samples received from farmers	3
Samples received in the form of flour	13
Old samples (storage experiments)	4
Total	250

The total number of loaves made was 1,189.

We are now prepared to undertake a limited number of milling and baking tests for the public, whenever any problems arise in regard to damaged or suspicious lots of wheat or flour. During the summer months, however, these researches are suspended for a period of about four months, owing to the pressure of other work.

EXPERIMENTS WITH CEREALS, ETC., ON THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

In the following tables will be found the results of the tests of varieties of grain at Ottawa in the season of 1913. The work here reported upon is carried out under the immediate supervision of the Dominion Cerealist.

WEATHER.

The season of 1913 may be characterized as hot and dry. Throughout the whole of the growing period of cereal crops, the drought was relieved by only occasional light showers, and the heat, though not so regular, was at times excessive. Warm, dry weather began about the middle of April, favouring early seeding. It was followed, however, by a cooler period of rather slow growth during May and June. Towards the end of June, a very hot, dry period set in, and this extended until the end of the third week in August, when a good rain marked the beginning of cooler weather.

As might be expected with such a season, the straw of cereal crops was short, but the grain filled surprisingly well, and the yield and quality were better than

anticipated. Harvesting this year was, in the ease and rapidity of its execution, a pleasant contrast to the same operation in 1912. All grain was saved in first-class condition.

The advantages of early sowing were strikingly evident last season, the early-sown plots giving much better returns than those put in at later dates.

CROSS-BREEDING AND SELECTING CEREALS.

Not very much cross-breeding is now being done on account of the necessity for devoting much time and land to the study and testing of the selections which have been made from the crosses of earlier years, and from commercial material.

The crosses made in 1912, between the Arlington Awnless barley and other varieties produced some very interesting plants last season. The progeny of these will doubtless give rise, in the coming summer, to a number of unusual types, among which it is hoped that there will be a few sorts of value.

Some crosses effected between Prelude wheat and other varieties have given rise to a quantity of very interesting and promising material for selection during the next few years.

PLOTS OF CEREALS, ETC., AT OTTAWA.

During the past season there were grown at Ottawa 283 small plots of cross-bred varieties not yet fixed in character, and 308 small plots of new varieties and selections which have been found to breed true to type and are now being propagated for test on a larger scale.

The regular test plots of grain, for the comparison of varieties, are one-sixtieth of an acre each. The number of plots of this size, or larger, for the past season was as follows: Spring wheat 164, winter wheat 6, oats 85, six-row barley 115, two-row barley 54, winter rye 5, flax 30, making a total of 459 plots and representing about 350 varieties and selected strains.

The total number of plots of all sizes grown last season was 1,050.

Owing to the shortage of land for the Cereal Division, the variety tests of emmers, spelts, peas, beans, spring rye, and most of the oats had to be omitted.

EXPLANATION OF TABLES.

In the following tables a discrepancy will be observed in some cases between the figure given as the number of days maturing and that which is obtained by counting the days between the date of sowing and the date of ripening. When any varieties have been sown later or earlier than the majority, it has been found necessary to introduce a correction, because, owing to the great difference between spring and mid-summer temperatures, a difference of a few days in sowing does not produce a corresponding difference in time of ripening.

The character of the straw is indicated by marks on a scale of ten points, according to the proportion of the plot standing erect at harvest time. A variety standing quite erect receives a mark of 10, while one completely lodged is marked 0.

As a rule, only named varieties are mentioned in the tables. Most of the varieties under test are new cross-bred sorts produced by the Dominion Cerealist and recorded for the present by means of numbers and letters. As soon as the value of these new sorts has been determined, names will be given to such of them as possess sufficient merit to warrant their introduction to the public.

New varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk (*).

OTTAWA.

SPRING WHEAT.

One hundred and sixty-one varieties and selected strains of spring wheat (including the durum wheats) were tested in the regular one-sixtieth acre trial plots at Ottawa. The wheat was sown from April 17 to 28, the seed being used at the rate of about one and one-half bushels per acre.

Only the named varieties are mentioned in the table.

Those varieties which have a letter after the name are new strains propagated at Ottawa from single plants selected by the Dominion Cerealist.

The yield per acre is expressed in pounds, and also in "bushels" of 60 pounds.

SPRING WHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing	Date of Ripening.	Number of days Maturing.	Average Length of Straw, including Head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Huron Selected*	Apr. 21	Aug. 3	102	44	10	4	3,180	53		64·8
2	Marquis*	" 17	" 4	105	40	10	4	2,850	47	30	65·1
3	Alpha Selected*	" 25	" 4	101	39	10	3·7	2,580	43		63·0
4	Early Russian*	" 25	" 3	100	40	9	4·2	2,580	43		64·8
5	Chelsea*	" 25	" 3	100	41	7	4	2,490	41	30	64·5
6	Prelude (135 B)*	" 21	July 22	90	43	10	2·5	2,400	40		64·0
7	Bishop*	" 25	Aug. 3	100	42	7	3·5	2,370	39	30	64·3
8	Pioneer (195 F)*	" 21	July 28	96	40	5	3·2	2,370	39	30	66·0
9	Early Red Fife*	" 17	Aug. 4	105	45	10	3·5	2,340	39		65·4
10	White Russian D*	" 25	Aug. 3	100	32	10	4·2	2,310	38	30	64·3
11	Hungarian White B*	" 25	July 31	97	34	10	3·5	2,220	37		65·0
12	Stanley A*	" 25	Aug. 3	100	32	10	4	2,160	36		63·4
13	Goose	" 25	" 4	101	30	9	2·2	2,130	35	30	64·5
14	Garton's No. 46	" 25	" 4	101	38	8	3·5	2,070	34	30	65·2
15	White Russian C*	" 25	" 3	100	32	10	4·2	2,070	34	30	64·0
16	Red Fern B*	" 25	" 3	100	30	10	4	2,040	34		64·2
17	Red Fern C*	" 25	" 3	100	30	10	4	1,860	31		65·0
18	Hungarian White D*	" 25	July 31	97	32	10	3·5	1,830	30	30	64·8
19	White Fife C*	" 25	Aug. 6	103	30	10	3·5	1,830	30	30	63·3
20	Pringle's Champlain C*	Apr. 25	July 31	97	30	10	3·7	1,680	28		64·1
21	Red Fife H*	" 18	Aug. 5	105	34	10	3	1,650	27	30	63·4
22	Kubanka A*	" 25	" 6	103	32	10	2·5	1,620	27		65·0
23	Preston H*	" 25	July 31	97	32	10	3·7	1,590	26	30	63·2
24	Roumanian	" 25	Aug. 6	103	32	10	2·5	1,380	23		65·8
25	Onega A*	" 25	July 25	91	27	10	2·7	1,350	22	30	62·0
26	Kubanka B*	" 25	Aug. 6	103	32	10	2·5	1,200	20		65·0
27	Kubanka C*	" 25	" 6	103	32	10	2·5	1,200	20		65·0
28	Red Fife M*	" 25	" 4	102	26	10	3·5	990	16	30	63·3

RECOMMENDED VARIETIES OF SPRING WHEAT.

For Ontario and Quebec.—Huron, very productive, early ripening, bearded, giving flour of fair baking strength. Marquis and Early Red Fife, early ripening, beardless, giving flour of very high baking strength. Red Fife and White Fife rather late in ripening, beardless, giving flour of very high strength. The extremely early ripening variety Prelude will be useful in some northern localities. It is an excellent variety but should not be expected to give a very large yield. It is not adapted for dry districts.

OTTAWA.

For the Maritime Provinces.—Red Fife and White Fife are very good. If early sorts are required, Huron and Marquis are recommended. White Russian is popular. It gives a large yield, but is of poor quality for bread-making.

For Manitoba and Saskatchewan.—Marquis is the best variety for most districts. Red Fife is excellent for localities where there is no danger of early frosts. For districts where extreme earliness is required and where there is sufficient rainfall to produce a good length of straw, the new variety Prelude is highly recommended. Pioneer, another new and very early-ripening sort should be given a trial if the conditions are too dry for Prelude.

For Alberta.—Red Fife is perhaps the best sort for some of the dry areas towards the south, but, wherever there is sufficient rainfall, Marquis should be tried. If early-maturing varieties with longer straw than Marquis are essential, Huron or Early Red Fife should be tested. Pioneer, a new variety recently introduced by the Dominion Cerealist, ripens earlier than any of the above-mentioned sorts, and has given good results under dry conditions. It is bearded and produces straw which is usually of fair length. It is not adapted to moist districts. For all localities where the tendency is towards the production of excessively long straw and where a very early-ripening wheat is required, Prelude is unquestionably the best variety known.

For British Columbia.—Huron is one of the best varieties. Red Fife and Marquis may not generally give quite such large crops but they are more popular for bread-making. Prelude or Pioneer may be useful in a few localities where extreme earliness is essential.

WINTER WHEAT.

Five of the most important varieties of winter wheat were sown early in September, 1912. The young plants grew fairly well in the autumn, but all varieties suffered so severely from winter-killing that no proper estimate of their yield could be made.

The varieties sown were Buda Pesth, Dawson's Golden Chaff, Egyptian Amber, Tasmania Red, and Turkey Red No. 380.

As the climate of Ottawa is rather too severe for satisfactory experiments with winter wheat, this part of the cereal work is being transferred to the Experimental Station at Sidney, B.C.

EMMER AND SPELT.

There was no land available last season for experiments with emmer and spelt.

OATS.

Only thirty-six varieties of oats were sown at Ottawa in the regular test plots. Most of the named varieties were unavoidably omitted on account of the shortage of land.

The oats were sown from April 22 to May 12, the seed being used at the rate of about two bushels per acre, except when the oats were unusually large, when about one-fourth or one-half as much seed again was used.

Only the named varieties of oats tested are mentioned in the table. The varieties not yet named are chiefly hulless sorts produced by crossing the Chinese Naked with two of the best oats which retain their hull. By subsequent selection only the hulless types have been retained.

OTTAWA.

The yield per acre is expressed in pounds and also in "bushels" of 34 pounds.

OATS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw, including Head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Eighty Day*	Apr. 22	July 18	80	37	7	6·5	2,820	82 32	28·3
2	Daubeney Selected*	May 2	" 30	87	40	10	7	2,640	77 22	34·9
3	Quebec C.*	" 12	Aug. 12	95	43	10	8	2,520	74 4	31·1
4	Banner B.*	Apr. 24	" 5	97	44	10	9	2,160	63 18	37·1
5	Victory	May 2	" 12	100	48	10	7	2,160	63 18	38·1
6	Quebec B.*	" 12	" 12	95	43	10	8	1,830	53 28	32·3
7	Gold Rain	Apr. 18	" 3	98	36	10	6·5	1,740	51 6	37·0
8	Quebec A.*	May 12	" 12	95	43	10	8	1,710	50 10	33·3

RECOMMENDED VARIETIES OF OATS.

Among the most productive varieties of white oats, Banner is especially recommended. Ligowo is somewhat earlier in ripening, but does not generally give quite so large a yield as Banner. Gold Rain is a very productive yellow oat. Black oats are not recommended, but Pioneer and Excelsior may be mentioned as two of the best varieties.

Farmers who require an extremely early-ripening variety should try Eighty Day, Orloff, or Sixty Day. The name Sixty Day is misleading, as this oat is not earlier than the other two. Somewhat less early, but probably more satisfactory, as a rule, are Daubeney and Tartar King. The latter is a very coarse variety.

SIX-ROW BARLEY.

One hundred and five varieties and selections of six-row barley were grown in the regular test plots last season. The seed was sown from the 2nd to the 8th of May, at the rate of about two bushels per acre. Some varieties gave a good yield, but the plots varied considerably on account of irregularities in the soil.

In the following table the yield per acre is expressed in pounds and also in "bushels" of 48 pounds.

Only the named varieties are here reported on. Many new cross-bred beardless and hulless sorts, produced by the Dominion Cerealist, were also tested.

SIX-ROW BARLEY.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing	Date of Ripening.	Number of days Maturing.	Average Length of Straw, including Head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Triumph	May 6	Aug. 5	91	42	10	3	3,030	63	6	47·0
2	Black Japan	" 6	" 6	92	34	10	2·2	2·970	61	42	49·3
3	Blue Short Head C.*	" 6	" 17	103	32	10	2	2,280	47	24	45·4
4	O.A.C. No. 21	" 6	" 3	89	42	7	2·5	2,220	46	12	50·8
5	Manchurian A.*	" 2	July 29	86	40	10	3	2,040	42	24	49·6
6	Nugent G.*	" 6	Aug. 5	91	40	8	3·2	2,040	42	24	50·
7	Escourgeon	" 6	" 6	92	42	8	3	2,010	41	42	52·3
8	Nugent E.*	" 6	" 5	91	40	8	3·2	1,980	41	12	49·5
9	Taganrog A.*	" 6	" 4	90	36	7	2·5	1,980	41	12	49·9
10	Guymalaye	" 6	" 2	88	32	3	2·2	1,890	39	18	63·0
11	Nugent A.*	" 6	" 5	91	43	10	3·2	1,890	39	18	51·0
12	Nugent H.*	" 6	" 5	91	36	6	3·2	1,890	39	18	51·2
13	Yale G.*	" 8	" 4	89	32	10	2·5	1,860	38	36	50·1
14	Stella G.*	" 6	" 4	90	33	8	3·2	1,800	37	24	50·2
15	Nugent B.*	" 6	" 5	91	40	9	3·2	1,770	36	42	49·6
16	Nugent K.*	" 6	" 5	91	36	8	3·2	1,740	36	12	50·0
17	Blue Short Head A.*	6	" 17	103	32	10	2	1,680	35	..	46·4
18	Odessa F.*	May 6	Aug. 4	90	36	9	3·2	1,650	34	18	48·3
19	Yale F.*	" 8	" 4	89	32	10	2·5	1,650	34	18	49·9
20	Yale D.*	" 8	" 4	89	32	10	2·5	1,590	33	6	50·2
21	Yale C.*	" 8	" 4	89	28	10	2·5	1,500	31	12	50·0
22	Odessa C.*	" 6	" 4	90	36	8	3·2	1,470	30	30	49·2
23	Nugent F.*	" 6	" 5	91	40	10	3·2	1,440	30	..	51·0
24	Success B.*	" 2	July 23	80	43	10	2·5	1,440	30	..	46·2
25	Nugent L.*	" 6	Aug. 6	92	36	8	3·2	1,410	29	18	50·0
26	Nugent C.*	" 6	" 5	91	36	10	3·2	1,380	28	36	51·0
27	Nugent D.*	" 6	" 5	91	36	9	3·2	1,380	28	36	50·0
28	Odessa D.*	" 6	" 4	90	36	9	3·2	1,380	28	36	48·2
29	Manchurian G.	" 6	" 3	89	30	10	3	1,290	26	42	47·0
30	Manchurian H.	" 6	" 3	89	30	10	3	1,290	26	42	49·9
31	Stella A.*	" 6	" 4	90	33	9	3·2	1,290	26	42	49·8
32	Yale A.*	" 8	" 4	89	28	10	2·5	1,290	26	42	51·0
33	Yale E.*	" 8	" 4	89	28	10	2·5	1,140	23	36	49·0
34	Yale H.*	" 8	" 4	89	28	10	2·5	1,050	21	42	50·6
35	Stella C.*	May 6	Aug. 4	90	33	8	3·2	1,020	21	12	49·4
36	Yale B.*	" 8	" 4	89	28	10	2·5	990	20	30	51·0
37	Oderbruch	" 6	" 5	91	30	10	3	900	18	36	50·1
38	Early Indian*	" 6	July 23	78	26	8	1·7	690	14	18	48·3

RECOMMENDED VARIETIES OF SIX-ROW BARLEY.

Among the most productive six-row barleys are Manchurian and Odessa. Manchurian is a selection from Mensury. O.A.C. No. 21 is also a very good selection, similar in character to Manchurian. Triumph and Black Japan, which stand at the head of the list in last season's trials, have not yet been under test long enough to determine their exact value.

The beardless (or "hooded") types of barley at present available in commerce are not very satisfactory. Success and Champion are two of the best kinds. They are both early in ripening; but their straw is not very strong, and they generally give rather a small yield.

The common sorts of hulless barley are Hulless White (beardless) and Hulless Black (bearded). These are characterised by weak straw.

It is expected that some of the new cross-bred beardless and hulless types will prove more satisfactory than any of the older varieties.

OTTAWA.

TWO-ROW BARLEY.

The plots of two-row barley were sown from the 2nd to the 5th of May, the seed being used at the rate of about 2 bushels per acre. As in the case of the six-row varieties, the yields were very irregular owing to inequalities in the soil, which the drought of summer served to accentuate.

Fifty-four varieties and selections of two-row barley were grown in the regular test plots. Only the named sorts are here reported upon.

The yield per acre is expressed in pounds and also in "bushels" of 48 pounds.

Two-Row Barley.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw, including Head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches.		Inches.	Lb.	Bush. Lbs.	Lb.
1	Black Two-Row	May 5.	Aug. 16.	103	39	7	3·7	3,000	62 24	52·4
2	French Chevalier	" 5.	" 6.	93	44	10	3	2,880	60 –	54·0
3	Gordon E*	" 5.	" 8.	95	40	10	3	2,760	57 24	51·1
4	Canadian Thorpe E*	" 5.	" 10.	97	34	10	3	2,730	56 42	52·0
5	Gold	" 2.	" 2.	91	30	7	3	2,610	54 18	54·0
6	Goldthorpe C*	" 5.	" 11.	98	27	10	2·7	2,610	54 18	51·5
7	Goldthorpe B*	" 5.	" 11.	98	35	9	2·7	2,190	45 30	51·4
8	Canadian Thorpe D*	" 5.	" 10.	97	34	10	3	2,040	42 24	52·0
9	Early Chevalier*	" 2.	July 29.	87	40	7	3·5	2,010	41 42	51·2
10	Hannchen	" 5.	Aug. 10.	97	30	8	4	1,950	40 30	53·1
11	Invincible	" 5.	" 11.	98	28	10	3·2	1,950	40 30	53·0
12	Beaver B*	" 5.	" 6.	93	48	10	4·5	1,920	40 –	51·2
13	Beaver E*	" 5.	" 6	93	48	10	4·5	1,860	38 36	51·8
14	Duckbill B*	" 5	" 12.	99	33	10	2·5	1,860	38 36	54·0
15	Duckbill C*	" 5.	" 12.	99	33	10	2·5	1,830	38 6	53·3
16	Kutais*	" 5.	" 3.	90	29	10	3·7	1,800	37 24	51·0
17	Gordon A*	" 5.	" 6.	93	38	10	2·7	1,740	36 12	54·1
18	Swedish Chevalier	" 5.	" 13.	100	28	10	4	1,710	35 30	51·6
19	Goldthorpe A*	" 5.	" 11.	98	35	9	2·7	1,680	35 –	51·6
20	Goldthorpe D*	" 5.	" 11.	98	35	10	2·7	1,650	34 18	53 0
21	Swan's Neck	" 5.	" 7.	94	32	10	3	1,620	33 36	53·0
22	Gordon D*	" 5.	" 8.	95	38	10	2·7	1,590	33 6	54·3
23	Clifford*	" 5.	" 6.	93	44	10	3·5	1,590	33 6	53·8
24	Primus	" 5	" 10.	97	28	10	3	1,440	30 –	53·5
25	Gordon B*	" 5.	" 6.	93	38	10	2·7	1,410	29 18	52·1
26	Jarvis*	" 5.	" 10	97	35	10	4	1,380	28 36	53·2
27	Beaver D*	" 5	" 6	93	48	10	4·5	1,200	25 –	52·8
28	Standwell	" 5.	" 5.	92	34	10	3·5	1,200	25 –	52·4
29	Caucasian Hulless	" 5.	" 5.	92	32	10	3·5	1,170	24 18	61·8

RECOMMENDED VARIETIES OF TWO-ROW BARLEY.

Among the best varieties of two-row barley may be mentioned Duckbill, Goldthorpe, Canadian Thorpe, and some of the strains of Chevalier, especially Early Chevalier. Hannchen, a comparatively new Swedish variety, is very productive but its poor straw is a serious drawback.

No satisfactory varieties of beardless or hulless two-row barley are yet available. The Dominion Cerealist is experimenting with a number of new cross-bred sorts of his own production.

Ottawa.

RYE.

Three varieties of winter rye were sown early in September, 1912. These plots grew fairly well in the autumn and suffered much less from winter killing than those of winter wheat. The yields per acre obtained were as follows:—

No.	Variety.	Yield of grain per acre.	Yield of grain per acre.		Weight per measured bushel after cleaning.
		Lb.	Bush.	Lb	Lb.
1	Mammoth White	2,460	43	52	59
2	Dominion	2,280	40	40	59·1
3	Thousandfold	1,980	35	20	58·9

Owing to the scarcity of land for cereal researches at Ottawa, it has been decided to transfer the experiments with winter rye (as well as with winter wheat) to Sidney, B.C.

For the same reason no plots of spring rye could be sown last spring.

FIELD PEAS AND BEANS.

Owing to shortage of land, no tests of field peas or beans could be made this year at Ottawa.

FLAX.

Twenty-two varieties and selections of flax were grown in the regular test plots. The seed was sown on May 12 at the rate of 60 pounds per acre. The dry weather of summer interfered very seriously with the yield of the flax, the best plot giving less than 21 bushels per acre. All the flax under test consists of new varieties and selections which have not yet been studied long enough to enable one to pick out, with certainty, the best sorts. No distribution can be undertaken at present.

The varieties under the name Foremost are selections from a commercial sample of Premost flax, in which slightly differing types were discovered. Novelty is the name given to the selection hitherto recorded as Novarossick B, and the name Longstem has been given to the exceptionally tall selection from common flax previously designated Common S.

The yield of seed per acre is expressed in pounds and also in "bushels" of 56 pounds.

16—1913—p. 764.

Plots and Strips of Cereals. Ottawa, Aug. 2, 1913.

Flax.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Plants.	Yield of Seed per Acre.	Yield of Seed per Acre.	Weight per Measured Bushel after Cleaning.
				Inches.	Lb.	Bush. Lb.	Lb.
1 Foremost A	May 12.	Aug. 5.	85	24	1,170	20 50	52·5
2 Novelty	" 12.	" 7.	87	19	1,080	19 16	53·4
3 La Plata A	" 12.	" 9.	89	20	1,035	18 27	53·0
4 " C	" 12.	" 4.	84	18	960	17 [illegible]	54·5
5 " B	" 12.	" 7.	87	18	855	15 15	52·3
6 Foremost B	" 12.	" 6.	86	18	750	13 22	54·9
7 Yellow Seed B	" 12.	" 6.	86	26	750	13 12	54·0
8 " " C	" 12.	" 6.	86	26	750	13 22	55·0
9 White Flowering B	" 12.	" 6.	86	23	690	12 18	55·1
10 " " A	" 12.	" 6.	86	23	660	11 44	55·0
11 Yellow Seed A	" 12.	" 6.	86	26	660	11 44	54·0
12 Common D	" 12	" 5.	85	24	600	10 40	54·3
13 Foremost C	" 12.	" 6.	86	18	570	10 10	54·2
14 Common A	" 12.	" 5.	85	30	540	9 35	56·0
15 " B	" 12.	" 5	85	30	420	7 28	55·0
16 Riga A	" 12.	" 9.	89	25	420	7 28	55·5
17 Common C	" 12.	" 5.	85	30	405	7 13	55·0
18 Russian B	" 12.	" 9.	89	21	405	7 13	54·2
19 Longstem	" 12.	" 9.	89	32	390	6 54	53·3
20 Russian A	" 12.	" 9.	89	21	375	6 39	55·1
21 Riga C	" 12.	" 9.	89	22	330	5 50	55·1
22 " B	" 12.	" 9.	89	22	270	4 46	54·0

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

J. A. CLARK, B.S.A., SUPERINTENDENT.

In 1910, the first season that cereals were experimented with at this Station, the best land on the Farm was chosen. In 1911 the area mentioned was required for a part of the rotation experiments in connection with the Field Husbandry work. The cereal plots were then transferred to what was known as the Chandler & Gay properties, where buildings, barnyard, fruit trees, roadway, and hedge rows had to be removed preparatory to fitting the land for the purpose intended. The swamp area was also cleared and part of it tile-drained. Mention was made of the lack of uniformity and the unsatisfactory condition of this land due to weeds in former reports. The soil is a nice friable sandy loam, and that it has been greatly improved for the purpose of testing cereal plots was shown by the much greater uniformity of duplicate plots this year over last year. The system of duplicate plots for almost all of the cereal work was commenced in 1912 owing to the unfortunate diversified condition of the land mentioned above, and also in order to get reliable data more quickly. We now get the average of two sowings without waiting two years for it. The land available for test plots was limited, and in order to adopt the duplicate system the number of varieties of the different cereals was considerably reduced. Those eliminated had either given inferior yields in previous tests or were considered of inferior quality by the Dominion Cerealist who had made tests at Ottawa.

A three-year rotation has been planned for the cereal work as follows: 1st year, roots; 2nd year, grain plots; 3rd year, clover. About 15 tons of barnyard manure are to be ploughed down with the clover sod in the autumn in preparation for roots.

In the spring of 1913 the third section was given its cleaning up before seeding to cereals. The roots of the couch grass were so numerous that in order to fit the land for a seed-bed they had to be hauled into piles. After the grain was sown and covered they were applied to the surface with the manure spreader. The extra work required to rid the land of weeds will account in a large measure for the very heavy yields of grain this present season.

CHARACTER OF SEASON.

The winter of 1912-13 was colder than usual here. The ground was exposed to the frost the greater part of the winter. Snow lay on the fields only one month and three days, from February 12 to the middle of March. The first half of February was cold, the thermometer reaching 17·5° below zero for a few hours, and as the ground was bare the frost entered the ground to a great depth. The sudden changes of March which took away almost entirely two feet of snow in a day caused great rushes of water over the fields, cutting great ditches and washouts in places never known to be injured in that way before. April was unusually mild, the temperature reaching a maximum of over 78°; this pushed forward the trees and grass about two weeks ahead of previous years. May was cool and so dull that growth remained almost at a standstill, the crop being sown, even on dry land, a little later than in 1912, which was much later than the average. The weather was ideal for working horses and the ground was well fitted for the crops as soon as it was ready. June was cool throughout, the mean temperature being 3° below normal, which delayed the seeding of heavy or wet land late into the month. The frequent showers and moderate temperatures of July made it a very favourable month for cereal crops. August was also favourable to growth and the maturing of the early grain. This was followed by splendid harvest weather in

September, and all of the early-sown grain was saved in excellent condition. The rainfall of October was excessive and almost continuous. The weather was unseasonably warm, sprouting considerable of the late grain, the greater part of which was not saved until the cool weather of November came.

Taken as a whole, the season was favourable to large yields. The very earliest grain did not do so well as the later varieties. The late-sown grain gave very large yields but was very badly injured by the weather conditions of autumn.

UNIFORM TEST PLOTS OF CEREALS.

The uniform test plots of cereals were sown as follows: Spring wheat, May 13; oats, May 15; barley, May 22. The grain was sown on duplicate plots of one-sixtieth of an acre each from hand-selected seed obtained from the choice heads of the 1912 cereal plots. The paths between the plots were 4 feet wide; these were seeded down to grass with the plots and one scrape of the light harrows used to cover them. Ten pounds of Early Red clover, 3 pounds of alsike, and 1 pound of White Dutch clover were sown per acre. This made a very strong growth and the paths were cut for hay in August. The plots were rogued twice, and every precaution used to maintain the purity of the different strains of grain.

EXPERIMENTS WITH SPRING WHEAT.

The grain grew very strong, except one plot of Chelsea which was weaker owing to an unavoidable dead-furrow. Scarcely any rust occurred, and the percentage of loose smut was much lower than last year; all heads observed were destroyed at once. The seed was treated with formaldehyde for stinking or ball smut; the result was most satisfactory.

SPRING WHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Stanley	May 13.	Aug. 29.	108	44	9·5	3·2	3,023	50 23	61·1
2	Early Red Fife	" 13	" 28.	107	45	10	3·5	2,911	48 31*	60·5
3	Marquis	" 13.	" 28.	107	46	10	3·2	2,843	47 23	62·2
4	Huron	" 13.	Sept. 2.	112	45	10	3·7	2,693	44 53	62·6
5	White Russian	" 13	Aug. 29.	108	45	9·5	4·2	2,693	44 53*	60·7
6	White Fife	" 13.	Sept. 3	113	44	10	3·5	2,633	43 53*	60·1
7	Red Fife	" 13.	" 2.	112	45	10	3·5	2,348	39 8	61·0
8	Chelsea	" 13.	Aug. 26.	105	43	10	3·2	2,201	36 41	63·3

*Plots injured by sparrows, damage estimated. The yields from Nos. 1, 4, 5, 6, and 8 are the averages from duplicate plots.

EXPERIMENTS WITH OATS.

The oats were very slow coming up, being fully two weeks sown before they were well above ground. The seed was all carefully treated with formaldehyde at the rate of 1 pint to 30 gallons of water, and though the seed was quite badly infested with loose smut (*Ustilago avenae*) yet a careful examination throughout the summer showed that the smut had been destroyed and that the grain was free from it. The plots of Daubeney headed out nine days before any of the other varieties and two weeks before the Norway. The weather was such that the Daubeney did not fill nearly so well as those heading out later

OATS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Gold Rain	May 15	Aug. 26	103	46	10	7·5	2,901	85 11	37·9
2	Lincoln	" 15	" 28	105	45	10	8	2,809	82 21	38·1
3	Thousand Dollar	" 15	" 26	103	43	10	7·5	2,785	81 31	38·5
4	Banner	" 15	" 28	105	46	10	8	2,777	81 23	37·0
5	Twentieth Century	" 15	" 26	103	46	10	8	2,775	81 21	39·0
6	Swedish Select	" 15	" 28	105	44	10	7·5	2,773	81 19	38·6
7	Siberian	" 15	" 28	105	45	10	8·2	2,768	81 14	37·4
8	Victory	" 15	" 27	104	43	10	7·5	2,717	79 31	39·5
9	Abundance, Garton's Regenerated	" 15	" 26	103	45	10	7·5	2,700	79 14	38·3
10	Ligowo, Swedish	" 15	" 28	105	45	10	7	2,618	77 0	39·0
11	Old Island Black	" 15	" 25	102	46	9	10	2,590	76 6	37·0
12	Early Blossom	" 15	" 28	105	45	10	9	2,487	73 5	40·2
13	Pioneer (Black)	" 15	" 25	102	41	8	8·5	2,486	73 4	38·0
14	Norway (Black)	" 15	" 25	102	42	10	8	2,429	71 15	35·6
15	Daubeney	" 15	" 21	98	39	10	7	1,823	53 *21	35·2

*Sparrows did considerable damage to Daubeney Oats, as it ripened first: 5 per cent damage allowed. The yields here given are the averages from duplicate plots.

EXPERIMENTS WITH BARLEY.

The plots of barley, from the standpoint of uniformity of stand, were the very finest we have grown at this station. They were greatly admired by the thousands of visitors who visited the station at the time they were ripening. The tables given below show that their opinion was justified. These plots were all practically ripe at the same time, though there were a few of the two-row varieties three days behind the others. The Old Island two-row is probably English Chevalier that was imported to the province many years ago. One of the very fine features of this barley is the fact that it sheds almost all of its beards in the field, this strain having been selected with reference to that character at this station.

BARLEY—SIX-ROW—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Nugent	May 22	Aug. 23	93	40	9·5	3·5	2,700	56 10	48·0
2	Manchurian	" 22	" 23	93	45	10	2·7	2,610	54 27	48·0
3	Stella	" 22	" 23	93	46	10	3·0	2,589	53 45	47·2
4	O. A. C. No. 21	" 22	" 23	93	43	9·5	2·7	2,549	53 5	45·8
5	Albert	" 22	" 23	93	40	9·5	3·2	2,521	52 25	48·1
6	Odessa	" 22	" 23	93	46	9·5	3·0	2,487	51 39	46·1
7	Oderbruch	" 22	" 23	93	42	9	3 0	2,469	51 21	48·3
8	Trooper	" 22	" 23	93	45	10	2·5	2,250	46 42	47·9

The yields are the averages from duplicate plots.

CHARLOTTETOWN.

BARLEY TWO-ROW.—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Old Island Two-Row	May 22	Aug. 26	96	36	10	3·	3,291	68 27	55·0
2	Hannchen	" 22	" 25	95	38	9·7	2·5	3,120	65 0	54·4
3	Gold	" 22	" 25	95	31	10	2·5	3,032	63 8	55·0
4	Invincible	" 22	" 26	96	43	10	2·7	2,818	58 34	53·3
5	Swedish Chevalier	" 22	" 26	96	33	10	3.0	2,771	57 35	53·6
6	Canadian Thorpe	" 22	" 23	93	44	10	2·7	2,708	56 20	53·0
7	Standwell	" 22	" 21	91	46	10	3·5	2,393	49 41	54·9
8	Clifford	" 22	" 22	92	46	10	3·0	2,337	48 33	53·1
9	Beaver	" 22	" 23	93	48	10	2·7	2,325	48 21*	47·9

*Note.—The plots of Beaver were very badly shelled by birds before cutting. These yields are the averages from duplicate plots.

EXPERIMENTS WITH PEAS.

Owing to the unusual weather conditions of 1912 the seed for the variety test of peas at this Station was lost, with the exception of Arthur, which is the earliest sort we have been able to secure. The germination of the Arthur pea that was grown at Charlottetown in 1912 was only 12 per cent strong. The seed was sown about twice as thick as usual and a very fair stand obtained showing that a large number of the weak seeds must have grown under soil conditions, which had shown but weak sprouts in the laboratory. The other three sorts were obtained from the Cerealist at Ottawa. Insects did considerable injury, making it difficult to grade out No. 1 seed.

PEAS.—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured bushel after Cleaning.
						Inches.	Inches.	Lb.	Busb. Lb.	Lb.
1	Solo	Medium	May 22	Sept. 15	116	62	2·7	2,019	33 9	60·9
2	Golden Vine	Small	" 22	" 15	116	61	2·0	1,691	28 11	63·8
3	Arthur (Ottawa 1912)	Large	" 22	" 1	102	55	2·5	1,519	25 19	63·3
4	Arthur (Ch'town)	" ..	" 22	" 1	102	50	2·5	1,466	24 26	.....

The yields here given are the averages from duplicate plots.

CHARLOTTETOWN.

FIELD PLOTS OF CEREALS.

A number of varieties of cereals that have proved satisfactory for certain purposes in the test plots were grown in multiplying plots on the regular Farm rotations. While a comparative table follows of the spring grains grown, it must be remembered that there were great differences between the soil and location of the different rotations. A few foot-notes explain some of these differences.

The demand for pure seed from the Station is increasing, as a great many of the farmers in the province are looking for the best foundation stock. Fifteen lots of oats, three lots of barley and two lots of wheat were sold at current prices to farmers in different sections of the province. Thirty bushels of seed oats were sent to the Kentville Experimental Station in the spring of 1913.

The grain from the following plots was saved in good condition during the fine weather of August and September, and with the exception of some of the wheat the quality is No. 1. The plots were carefully rogued during the summer.

Multiplication Plots of Cereals.

SPRING WHEAT.

No. Field.	Name of Variety.	Size Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing	Weight of Straw.	Strength of Straw on a Scale of 10 Points.	Yield Grain per Acre.	Yield Grain per Acre.
		Acre.				Lb.		Lb.	Bush. Lb.
D. 1	Marquis	1·0	May 15	Sept. 6	114	2,070	5	1,178	19 38
F. 1	Red Fife	0·88	" 17	" 9	115	2,090	6	1,114	18 34
B. 1	White Fife	1·0	" 16	" 16	123	2,217	4	913	15 13

OATS.

G. 2	Gold Rain	0·4	May 20	Sept. 6	109	3,007	8	2,168	63 26
A. 1	Banner	1·0	" 13	Aug. 29	108	2,333	10	2,107	61 33
C. 1	Old Island Black	0·57	" 16	" 27	103	2,588	10	1,922	56 18
B. 3	Victory	1·0	" 20	Sept. 6	109	1,557	10	1,898	55 28
G. 7	Daubeney	0·4	" 20	Aug. 27	95	2,100	10	1,218	35 28

BARLEY SIX-ROW.

A. 4	Manchurian	1·0	May 21	Sept. 2	104	3,878	10	1,857	38 33

BARLEY TWO-ROW.

F. 3	Hannchen	0·88	May 28	Sept. 9	104	2,615	7	1,522	31 34

The Marquis wheat was rusted badly. The joint-worm did fully 25 per cent injury. This seed will not be sold. The Red Fife was on poor land. F. 1 is being renovated largely by cultivation, 13 tons 1,270 pounds of manure applied in 1912 was all it has received in fifteen years. The White Fife was rusted even worse than the Marquis. The grass in it was very strong, choking the grain out badly. Joint worm did much damage in this field.

Hannchen quite badly injured by cut-worms in one corner of field.

Charlottetown.

SESSIONAL PAPER No. 16

CO-OPERATIVE TEST OF THREE VARIETIES OF OATS.

The co-operative test of oats begun in 1912 was continued on three of the farms and at this Station. The same three varieties of oats were tested in duplicate plots of one-sixtieth acre each on the four farms mentioned below. Mr. Garnet LeLacheur, Seed Inspector, and Mr. Richard Creed, Assistant Inspector, gave the work careful attention. They furnished the field notes and took supervision of the field work. The grain was forwarded to the Experimental Station where it was threshed, graded and weighed. The information given below was gathered from facts that came under my own observation. I think these tests will be of great value to the farmers of Prince Edward Island when sufficient time has elapsed, so that the averages may extend over a number of years.

Co-operative Test Plots of Oats.—Test of Banner, Ligowo and Old Island Black Oats, in Queens and Kings counties, the averages from duplicate plots are here given.

Name of Experimenter.	Location.	Yield per Acre.					
		Banner.		Ligowo.		O.I. Black.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
Experimental station..	Charlottetown, P.E.I..	81	23	77	..	76	6
Mr. A. M. Stuart..	Belle River, P.E.I....	78	18	62	17	71	24
Mr. E. G. Giddings..	Abney, P.E.I.....	58	1	52	10	57	22
Mr. James Simpson..	Bay View, P.E.I	49	14	42	27	47	31
Average yield per acre, 1913..		66	31	58	22	62	12
Grand average yield per acre, 1912-13, from twenty plots of each variety on seven farms..		61	10	52	24	55	26

From the data gathered to date we note that Banner has produced an average of 5 bushels and 18 pounds more per acre than Old Island Black, and it has produced 8 bushels and 20 pounds more than Ligowo. The Old Island Black has produced an average of 3 bushels and 2 pounds more than Ligowo.

We wish to thank the men mentioned above for their very careful and painstaking assistance which they have given us in connection with this series of experiments.

Charlottetown.

EXPERIMENTAL FARM, NAPPAN, N.S.

W. W. BAIRD, B.S.A., SUPERINTENDENT.

CHARACTER OF SEASON.

During the winter of 1912-13 very little snow fell and no severe frost was realized during the latter part. Practically no snow fell after the 15th of March. Over two inches of rain fell on the 27th of that month, doing considerable damage by washing the fields, especially those ploughed on the side hills.

April was, on the whole, a typical month, much broken weather with alternate rain and snowfall, especially during the early and latter parts. From the 21st to the 26th a very warm spell was experienced, making the land almost workable. The highest temperature was on April 25, 71° F., the lowest on the 10th, 14° F., with a total precipitation of 3·46 inches, and out of a possible of 407 hours sunshine only 132·7 hours were recorded.

From the 1st to the 10th of May the weather was dry and warm and seeding started on the 6th, some four days earlier than for the season of 1912, and became quite general by the 10th, but was greatly retarded by several days of wet, cold weather. This kept the ground at a very low temperature. Several degrees of frost were recorded on the nights of the 1st, 2nd, 4th, 9th, 11th, 13th, 16th, 17th and 18th. Seed sown on the 6th was eleven days in germinating. Vegetation which gave great promise during the first few days in May made very little gain during the remainder of the month. The highest temperature was on the 6th, 67° F., and the lowest on the 9th, 26° F., with a total precipitation of 2·38 inches, and out of a possible of 463 hours sunshine only 169·1 hours were recorded.

June was rather cooler than usual, the highest temperature being 10° lower than the highest for June, 1912. The precipitation was also lighter than for the same period in the previous season. On the 13th, 1° of frost was registered. Seeding and planting were fairly well through by the 21st. All vegetation made very slow growth until the latter part of the month, at which time the weather conditions became much more favourable for growth. The highest temperature recorded was on June 11, 74° F., the lowest on the 13th, 31° F., with a precipitation of 1·97 inches, and out of a possible of 470 hours sunshine only 255°5 hours were recorded.

July for the most part was dull and wet, rain falling on twelve different days, giving a total precipitation of 4·98 inches. The highest temperature recorded was on July 5, 82° F,; lowest on the 17th, 41° F. Out of a possible of 474 hours sunshine only 226·5 hours were recorded. Notwithstanding the prevalence of cool and rainy weather, vegetation made a remarkable growth. Grain and roots especially advanced very rapidly. Haying was delayed some few days by the wet weather, but the greater part of the clover was secured in good condition.

During August the weather conditions were very much brighter and a great deal of work was accomplished. By the end of the month most of the grain on the Farm was ready to cut. All plots of barley were cut during the last week of August. Roots continued to make very rapid growth. The highest temperature recorded during August was on the 3rd, 80° F., the lowest on the 21st, 33° F., and out of a possible of 474 hours sunshine only 238·1 hours were recorded.

September was, on the whole, very fine. Though light showers fell on eight different days, the precipitation was not heavy. Very fair harvest weather was

experienced. The major part of the early-sown grain was harvested in good condition, but as the wet, cold spell in the spring delayed seeding, a very large acreage was still unfit to cut to this date. The highest temperature recorded for September was on the 2nd, 78° F., and the lowest on the 16th, 31° F. Slight frosts were recorded on two days, the 6th and 16th. The total precipitation for the month was 2·70 inches. Out of a possible of 376 hours sunshine only 165·95 hours were recorded.

October for the greater part was a very unseasonable month. Rain fell on thirteen different days during the month, giving a total precipitation of 7·83 inches, which was the heaviest by far recorded at this Farm since October, 1907, during which month 8·42 inches were recorded. Owing to the lateness of the season, much grain was still unharvested, consequently inestimable damage resulted, as it was ruined for seed, and hardly fit for feed.

While the records for the month of November show quite a variation of temperature at times, on the whole it may be called rather a seasonable month. The roots were harvested during the first part of the month, and the great damage caused by the enormous rains of the previous months was then realized. These rains did not affect the crops only, but also the land, putting it in such a condition as to render autumn ploughing impossible. The first half of the month was unusually fine for November. The highest temperature, 65° F., was recorded on the 10th. The latter part of the month was somewhat colder, and on the 29th the temperature dropped to 10°, which was the lowest for the month. Snow fell on the 26th and 27th, and this together with the rain which fell on five other different days, viz., 4th, 10th 15th, 20th, and 23rd, made the total precipitation 2·03 inches. November was rather dull throughout, and only 115·45 hours of sunshine were recorded.

December, though rather mild for that month, nevertheless displayed some of its natural characteristics, in that it brought the first appearances of winter. Until the 13th the weather was somewhat broken, with alternate rain and snowfall. Following this from the 14th to the 20th some 4 inches of very light snow fell. On the 24th snow again fell, this time to a depth of 7 inches, and on the 26th a very heavy cold rain fell. The weather turned very cold and clear on the 27th, which weather continued throughout the remainder of the month. The snowfall of the month gave us a precipitation of 1 60 inches and the rain a precipitation of 2·65, making a total of 4·25 inches.

EXPERIMENTS WITH SPRING WHEAT.

Eleven varieties of spring wheat were sown in uniform test plots of one-fortieth of an acre. The land was a medium heavy clay loam, with a sandy loam subsoil to a depth of 9 inches, which had been ploughed in the fall of 1912 and well cultivated in the spring of 1913 to get a good seed-bed. Seed was sown at the rate of 1 bushel 3 pecks per acre.

Owing to the low temperature of the ground the seed was from eleven to sixteen days germinating, and did not show above the ground until the eighteenth or twentieth day.

Considerable weeding had to be done in order to keep the plots clean. After the middle of June the grain made very rapid growth, and at the end of the season an excellent stand was realized. All plots were free from lodging and rust, but a few of the plots had as high as from 2 to 3 per cent smut. This was all hand-picked out as soon as it appeared.

The following table gives the results from the named varieties under test:—

SPRING WHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Red Fife	May 6	Sept. 13	130	50	10	3·0	2,440	40 40	60
2	*Marquis	" 6	" 6	123	50	10	3·0	2,383	39 43	61
3	Early Red Fife	" 6	" 13	130	50	10	3·2	2,280	38 ..	60
4	Stanley	" 6	" 8	125	53	10	3·2	2,200	36 40	60
5	White Fife	" 6	" 15	132	52	10	4·0	2,200	36 40	58
6	Bishop	" 6	" 6	123	50	10	2·7	2,120	35 20	60·5
7	Bobs	" 6	" 6	123	48	10	3·2	2,040	34 ..	60
8	Huron	" 6	" 4	121	46	10	3·0	1,880	31 20	61
	Average							2,193	36 33	

* Average of two plots.

In comparing the above table with those of previous years, it will be noted that all varieties were from eight to twelve days longer maturing.

The "Early Red Fife" does not appear to ripen any earlier than the ordinary Red Fife in this climate.

The four following varieties can be recommended to be the most profitable ones to grow in this section: Marquis, Red Fife, Stanley, and Huron (bearded).

EXPERIMENTS WITH OATS.

Twelve varieties of oats were sown in uniform test plots of one-fortieth of an acre. The land was from medium to heavy clay loam, with a sandy loam subsoil to a depth of 9 inches. Same method of preparation as for wheat.

All seed was sown on May 7 at the rate of three bushels per acre, which had been selected from best heads in the plots of the previous year.

All plots were uniform in growth and stand and were free from lodging. As the grain had not been treated for smut, a number of affected heads were found throughout the plots and were hand-picked as soon as they appeared. It will be necessary to treat all grain next year for smut. Some of the varieties were badly attacked with rust, but it came too late to cause any appreciable damage in the yield.

The following table gives comparative results:—

OATS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on Scale of 10 Points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Abundance	May 7	Aug. 30	115	51	10	8	2,100	61 26	34
2	Twentieth Century	" 7	" 30	115	46	10	8	2,080	61 6	34
3	Banner	" 7	" 30	115	45	10	8	2,020	59 14	34
4	Victory	" 7	" 30	115	47	10	7	2,000	58 28	34
5	Gold Rain	" 7	" 27	112	50	10	7	1,960	57 22	33
6	Thousand Dollar	" 7	" 30	115	46	10	8	1,920	56 16	34·5
7	Lincoln	" 7	" 30	115	49	10	7	1,860	54 24	34
8	Swedish Select	" 7	" 30	115	45	10	7	1,840	54 4	34
9	Danish Island	" 7	Sept. 2	118	46	10	7·5	1,820	53 18	33
10	Ligowo	" 7	Aug. 30	115	48	9	7	1,800	52 32	35
11	Pioneer	" 7	" 25	110	45	9	7	1,680	49 14	34
12	Siberian	" 7	Sept. 2	118	44	10	7	1,640	48 8	34
	Average							1,893	55 23	

From the above table it will be noted that Abundance, Twentieth Century, and Banner gave the heaviest yields; also that they have a good length and strength of straw.

Ligowo gave the heaviest weight per measured bushel, and hence can be classed among the heaviest producers. These four varieties can be recommended for use in this district.

Gold Rain, while a heavy yielder, is more subject to rust. Pioneer is the only black variety in the above table, and is a fair yielder. Pioneer and Gold Rain were the earliest in ripening.

EXPERIMENTS WITH BARLEY.

Twelve varieties of barley were sown in uniform test plots of one-fortieth of an acre, six of six-row and six of two-row.

The land was medium heavy clay, sandy loam subsoil. It was planted to roots the previous year and manured at the rate of 20 tons per acre of barnyard manure, and ploughed in the fall of 1912. In the spring of 1913 it was well cultivated, but did not receive any manure or fertilizer.

Grain was sown on May 7 at the rate of two bushels per acre. Three of the varieties were attacked by sparrows, viz., Hannchen, Manchurian and Invincible. In the case of Hannchen there was an estimated loss of at least 30 per cent, and in the latter two not more than 10 per cent. The yields given in the tables are those actually obtained.

The following tables give the comparative results of the two-row and six-row varieties:—

BARLEY.—SIX-ROW.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Nugent	May 7	Aug. 26	111	46	10	3	2200	45	40	48
2	Odessa	" 7	" 20	105	47	10	2.5	2000	41	32	51
3	Oderbruch	" 7	" 20	105	43	9	2.5	1880	39	8	51
4	Stella	" 7	" 29	114	44	9	2.7	1720	35	40	50
5	O.A.C. No 21	" 7	" 28	113	45	10	2.7	1640	34	8	47
6	Manchurian	" 7	" 23	108	48	8	3.5	1400	29	8	46
	Average							1806	37	30	

BARLEY TWO-ROW.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Swedish Chevalier	May 7	Aug. 28	113	42	8	4	2400	50	..	51.5
2	French Chevalier	" 7	" 28	113	42	9.5	4	2200	45	40	50
3	Canadian Thorpe	" 7	" 25	110	45	10	3	1920	40	..	50
4	Invincible..	" 7	" 25	110	50	10	3.2	1840	38	16	50
5	Hannchen.....	" 7	" 23	108	45	10	3.2	1760	36	32	51
6	Beaver	" 7	" 23	108	48	10	3.7	1600	33	16	52
	Average.....	.....	.....	.....	.....	.....	.....	1953	40	33	.....

In the six-row varieties it will be noted that the Manchurian and Odessa are two of the earliest maturing varieties and have, in the case of Manchurian, good length of head, but slight weakness in the straw; whereas Odessa is strong in the straw but short in the head. Yet these are two varieties that can best be recommended from the above table. Manchurian is a selected strain of Mensury. This selection has surpassed in yield, both the original Mensury from which it was derived and also the closely related Mandscheuri.

O.A. C. No. 21 has only been grown here for a short time, but it is a promising barley.

Recommended varieties from the two-row barleys are Swedish Chevalier, French Chevalier, and Invincible. The former two are late in maturing, but give a good yield of nice grain. Invincible ripens somewhat earlier and yields grain of fair quality.

EXPERIMENTS WITH BUCKWHEAT.

Five varieties of buckwheat were sown in uniform test plots of one-fortieth of an acre. The land was medium clay loam, ploughed from clover the previous year.

It was harrowed twice with a cutaway harrow and once with a smoothing harrow. All seed sown was on June 11 at the rate of 3 pecks per acre.

Due to this piece of land being very bad in couch grass, the results and yields are not quite as good as we should have liked to see.

The following table gives the comparative results:—

BUCKWHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head	Strength of Straw on a Scale of 10 Points.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
					Inches.		Lb.	Bush.	Lb.	Lb.
1	Tartarian	June 11	Sept. 5	86	33	9	2,120	44	8	51
2	Rye	" 11	" 5	86	36	10	2,080	43	16	50
3	Japanese	" 11	" 5	86	33	9	1,760	36	32	46
4	Silver Hull	" 11	" 5	86	34	8	1,660	34	28	48
5	Grey	" 11	" 5	86	34	8	1,560	32	24	49
	Average						1,836	38	12	

From the above table it is to be noted that Tartarian and Rye give the best yields, which are 44 bushels 8 pounds of Tartarian and 43 bushels 16 pounds in case of Rye, and further, that they give the heaviest weight per measured bushel. Hence we would conclude that these two varieties are the most profitable to grow for feed purposes.

Silver Hull yields flour of excellent quality.

FIELD CROPS OF SEED GRAIN.

Some seven acres were sown to wheat, oats, and barley, in acre lots. The land was from a medium to a heavy clay loam.

The two acres on which the wheat was sown had received 20 tons of barnyard manure and produced roots the previous year. This was ploughed in the fall of 1912 and well cultivated in the spring of 1913 to ensure a perfect seed-bed.

That on which the oats and barley were sown had received 25 tons of barnyard manure and produced a crop of roots the previous year. It was likewise ploughed in the fall of 1912 and a good seed-bed prepared in the spring of 1913. Neither of those fields received fertilizer of any kind this season. The following table gives the yields:—

—	Date of Seeding.	Date of Ripening.	Yield.	
			Bush.	Lb.
Wheat—				
1 acre Huron	May 27	September 5	28	..
1 acre Red Fife	" 7	" 15	25	30
Oats—				
1 acre Abundance	May 10	August 30	61	5
1 acre Banner	" 10	" 30	58	28
1 acre Ligowo	" 10	" 30	50	9
Barley—				
1 acre French Chevalier	May 17	August 30	36	40
1 acre Manchurian	" 17	" 30	31	..

All grain thus produced, after it has been thoroughly cleaned, will be for sale during the spring of 1914 at a reasonable price. This grain is the production of hand-selected heads from plots of previous years and sown in small plots to ensure good seed of high quality and true to type.

NAPPAN.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUEBEC.

JOS. BEGIN, SUPERINTENDENT.

Regular experimental work in the testing of varieties of grain has not yet been commenced on this Station; but preparations for such tests are being made.

This season, Banner oats only were sown. The yield varied on different fields, according to the condition of the soil and the date of sowing, from 25 to 65 bushels per acre. The best yield was from the field sown earliest (May 6).

EXPERIMENTAL STATION, CAP ROUGE, QUEBEC.

GUS. A. LANGELIER, SUPERINTENDENT.

CHARACTER OF SEASON.

The season of 1913 was one of the best for cereals, in this district, that we have had for many years. The spring was very early and all trial plots were sown during the last two days of April, whilst the main crop was put in before the middle of May. This is about ten days sooner than seeding can be done in an average season. The grain which was sown from the 7th to the 15th of May made a splendid growth, as there was plenty of heat and enough precipitation to hasten germination and force all vegetation. Farmers who delayed seeding operations until the end of May saw their grain at a standstill during the drought which lasted all through August, and thereby no doubt lost at least 25 per cent of their crop. The early-sown grain was too far advanced to suffer and the yield was heavy throughout the district.

VARIETY TESTS.

The trial plots are now permanently located on a piece of ground where a three-year rotation is used. The first year, roots and Indian corn plots are grown; the second, the plots of cereals come; and the third, we have plots of clover to find with what kind of cereal it grows best.

Fourteen varieties of spring wheat, four of two-row barley, seven of six-row barley, ten of oats, and six of peas, were sown on one-sixtieth acre plots.

SPRING WHEAT.

Fourteen varieties of spring wheat were tried on a uniform piece of sandy loam, naturally drained, where Indian corn was grown last year. The subsoil is shale, at from 15 to 24 inches from the surface. The land was ploughed during October, 1912; it was well disced, harrowed, rolled, and sown with the drill on the 29th and 30th of April, at the rate of 1½ bushels per acre. The high temperature of the beginning of May, 79° F., on the 3rd, 5th, 6th, and 85° on the 7th, with a total precipitation of 0·26 inches on the 3rd, 9th, and 10th hastened germination, and the grain was up when on the 15th the thermometer went down to 25·2°, and to 27·2° on the 16th. This, in my opinion, was the cause of the failure to grow of Alpha Selected, Bishop, Bobs, Marquis, Red Fife and White Fife wheat. Even if this was not the cause, it is nevertheless true that the varieties which gave no crop are not so resistant to adverse conditions as those which yielded even a light one.

The most promising wheats for this district, according to our experiments, seem to be Preston and Huron. The latter always looks so well that I am inclined to favour it.

The following tables will give some information as to the plots grown in 1913, and also a summary of everything done since the establishment of this Station:—

SPRING WHEAT.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Preston	April 29	Aug. 19	113	27	10	3	1,380	23 ..	60 1
2	Huron	" 29	" 18	113	32	10	3·5	1,020	17 ..	58 4
3	Early Red Fife	" 29	" 25	119	26	10	2·5	720	12 ..	62·2
4	Yellow Cross	" 29	" 19	113	25	10	2	360	6 ..	61 6
5	Alpha Selected	" 29	Failure.							
6	Bishop	" 29	" .							
7	Bobs	" 29	" .							
8	Marquis	" 30	" .							
9	Red Fife	" 29	" .							
10	White Fife	" 29	" .							

SPRING WHEAT.—Results for three years.

Number.	Name of Variety.	No. of Days Maturing.			Average No. of Days Maturing.	Yield of Grain per Acre.						Average Yield of Grain per Acre.	
		1911	1912	1913		1911		1912		1913			
						bush	lb	bush	lb	bush	lb	bush	lb
1	Preston	85	106	113	101·3	30	45	12	..	23	..	21	55
2	Huron	87	112	113	104 0	39	..	9	..	17	..	21	40
3	Bobs	87	106	.....	96·5	35	30	6	..	Failure		20	45
4	Bishop	87	106	.....	96·5	30	30	10	..	Failure		20	15
5	Marquis	87	112	.....	99·5	28	45	11	..	Failure		19	52
6	Red Fife	85	120	.....	102·5	21	30	7	..	Failure		14	15
7	Yellow Cross	87	97	113	99·0	27	15	8	..	6	..	13	45
8	White Fife	87	120	.....	103 5	14	45	11	..	Failure		12	52
9	Early Red Fife	85	112	119	105·3	12	45	6	..	12	..	10	15

OATS.

Ten varieties of oats were tried on a uniform piece of sandy loam with subsoil of shale at from 15 to 24 inches from surface. This land is naturally drained. In 1912, Indian corn was grown there and the area was ploughed in October. In the spring of 1913, it was well disced with the big "cutaway," harrowed, rolled, and sown with the drill on April 29. The rate of seeding was from 2½ to 3¼ bushels per acre, according to germination test of seed. As the temperature was favourable, the grain came up quickly.

Every farmer in this district grows oats, and it is by far the most important cereal. Thousand Dollar and Twentieth Century have not shown anything which could recommend them, from the standpoint of earliness or yield, in three years. Banner is the most popular here, but Daubeney seems to be liked by many farmers who see the plots. There is not much difference in earliness between Daubeney and Eighty Day, and the grain of the former is much larger. However these two are in a class by themselves for colder regions. The Swedish varieties are all promising, and we may yet find

one amongst them which will supplant Banner, though it is not very probable. Up to the present, Banner is the variety which I recommend to the farmers of this district.

The following tables give information as to the varieties tested in 1913, and also a summary of work done since 1911 with oats:—

OATS.

Number.	Name of Variety.	Date of sowing	Date of Ripening.	No. of days maturing.	Average Length of straw including head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per acre.	Yield of Grain per acre.		Weight per measured bushel after cleaning.
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Victory	April 29	Aug. 19	112	36	10	6.5	2760	81	6	38.2
2	Gold Rain	"	" "	112	39	10	7	2580	75	30	38.2
3	Siberian	"	" 28	121	36	10	6	2460	72	12	37.2
4	Abundance (Garton's)	"	" 19	112	37	10	7	2400	70	20	38.2
5	Banner	"	" "	112	40	10	6.5	2340	68	28	34.0
6	Ligowo(Swedish)	"	" 28	121	38	10	6 5	2100	61	26	37 2
7	Twentieth Century	"	" 19	112	40	10	7	2040	60	—	34 0
8	Eighty Day	"	" 7	100	34	10	6	1500	44	4	34.0
9	Thousand Dollar	"	" 19	112	34	10	7.5	1500	44	4	35.6
10	Daubeney	"	" 8	101	28	10	8	1440	42	12	34.0

OATS.—Results for Three Years.

Number.	Name of Variety.	No. of Days Maturing.			Average No. of Days Maturing.	Yield of Grain per Acre.						Average Yield of Grain per Acre.	
		1911.	1912.	1913.		1911.		1912.		1913.			
						Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Victory	87	.....	112	99·5	72	12	..	..	81	6	76	26
2	Banner	87	.....	112	99·5	82	32	..	..	68	28	75	30
3	Gold Rain	87	120	112	106·3	83	28	47	22	75	30	69	4
4	Abundance (Garton's)	87	120	112	106·3	62	7	49	14	70	20	60	25
5	Siberian	87	120	121	106 3	74	4	28	8	72	12	58	8
6	Ligowo (Swedish)	87	120	121	106·3	82	17	30	..	61	26	58	8
7	Twentieth Century	87	120	112	106·3	76	26	30	..	60	.	55	20
8	Daubeney	76	106	101	94 3	84	24	21	24	42	12	50	20
9	Eighty Day	74	100	100	91·3	71	16	28	8	44	4	47	32
10	Thousand Dollar	87	120	112	106·3	62	22	30	..	44	4	45	20

PEAS.

Six varieties of peas were tried in 1913 on a uniform piece of sandy loam with a shaly subsoil at from 15 to 24 inches from the top. The plots were all one-sixtieth of an acre. The ground was in Indian corn during 1912 and was ploughed in the fall of that year. In the spring of 1913, it was passed over with the big disc, harrowed, rolled, and seeded with the drill. The weather was just right for quick germination, and the peas were soon up. The thermometer went down to 25·2° and 27° F. after

they were above ground, but peas have the advantage of resisting slight frost. Arthur Selected has been at the head both in 1911 and in 1913, and up to the present, it seems the best variety to recommend to farmers.

The following tables give information as to the varieties tested in 1913, and also a summary for the years 1911 and 1913. The pea crop was a failure in 1912:—

PEAS.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
						In.	In.	Lb.	Bus.	Lb.	Lb.
1	Arthur Selected. ..	Medium	April 30	Sept. 3	126	42	2·7	2,820	47	..	61 6
2	English Grey.....	" ..	" 30	" 3	126	37	2	2,580	43	..	62·7
3	Golden Vine.....	Small ..	" 30	" 3	126	28	2	2,220	37	..	63 7
4	Prussian Blue.....	Medium	" 30	" 3	126	38	2·5	2,040	34	..	63·7
5	White Marrowfat..	Large ..	" 30	" 3	126	41	2·2	2,010	33	30	63·7
6	Wisconsin Blue....	Medium	" 30	" 3	126	36	2	1,620	27	..	65·9

PEAS.—Results for Two Years.

Number.	Name of Variety.	No. of Days Maturing.		Average No. of Days Maturing.	Yield of Grain per Acre.				Average Yield of Grain per Acre.		Size of Pea.
		1911.	1913.		1911.		1913.				
					Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	
1	Arthur Selected.....	87	128	106 5	38	..	47	..	42	30	Medium.
2	English Grey.....	87	126	106·5	33	30	43	..	38	15	"
3	Golden Vine.....	87	126	106·5	32	15	37	..	34	37	Small.
4	White Marrowfat.....	87	126	106·5	29	..	33	..	31	..	Large.
5	Wisconsin Blue.....	87	126	106·5	32	30	27	..	29	45	Medium.
6	Mackay	82	126	104·0	29	15	..	..	29	15	"
7	Black-eye Marrowfat....	82	126	104·0	27	45	..	..	27	45	Large.
8	Prussian Blue.....	87	126	106·5	20	45	34	..	27	22	Medium.
9	Chancellor.....	82	126	104·0	26	..	..	..	26	..	Small.
10	Paragon.....	82	126	104·0	17	..	..	..	17	..	Medium.

BARLEY

Seven varieties of six-row and four of two-row barley were tried in 1913. The land grew Indian corn in 1912 and was ploughed during October of that year; it was disced, harrowed, rolled, and sown with the drill the last day of April, 1913. The soil is a sandy loam, uniform for all plots, with a shaly sub-soil at from 15 to 24 inches from the surface, and is naturally drained. The fine weather of the beginning of May hastened germination and the grain was up when the frost of the 15th and 16th came, 25·2° and 27·2° F., respectively. In my opinion this was what killed most of the barley, though according to a very thorough analysis of the soil, it has been found by the Dominion Chemist, Mr. Frank T. Shutt, that the supply of lime is deficient.

CAP ROUGE.

Few farmers of the region are interested in barley, which does not seem to do well around here. When the fact is taken into consideration that a large proportion of the soil is light, it must be acknowledged that barley is not the most suitable cereal to grow. It should, however, receive more consideration for two main reasons: because it can be sown much later than oats without ill effects on its yield, and also because it is probably much better than oats as a nurse crop for clover and grass seed. The first reason is a very good one as, with our very short season and scarcity of help, a farmer is greatly handicapped when the spring is late and wet. It would be much better, then, to sow a barley like Success, which matured at the Station in an average of 79·5 days, than an oat like Banner, which took exactly 20 days longer to ripen. The second question is a most important one, especially in this district where most of the land is left in hay and pasture for periods of from four to ten years. If a cereal is found with which clover and grass seed will grow better and yield more hay and pasture, it will be of great benefit to the farmers. My impression is that barley will be much better than oats in this respect.

No tables are given for barley, because they would not furnish reliable information, as there was not a normal crop since 1911.

MISCELLANEOUS.

EXPERIMENTS WITH OATS.

Though coming under the Division of Field Husbandry, experiments which are being made with different rates of seeding may be mentioned here. Different quantities of grass and clover seed are being sown in the plots used for above experiment to see if it pays to be liberal with the seed, and also to find out with what quantity of oats as a nurse crop the best yield of hay can be had.

BARLEY AS A NURSE CROP.

In 1912, all test plots of cereals were sown to an ordinary clover and timothy mixture. The plots, in 1913, gave an average per acre of 4,759 pounds of hay where the barley had been used as a nurse crop, and only 3,635 pounds where oats were sown. This is a difference of 24 per cent, and it shows the importance of barley for this purpose in a district where, quite often, four or five consecutive crops of hay and two or three years of pasture are taken before the land is ploughed.

PEAS.—THEIR HIGH PROTEIN CONTENT.

Peas are very little grown in the district, though for stock feeding they would be very advantageous on account of the high protein content. With the price of mill by-products constantly soaring higher, it will soon be advisable to grow at least a portion of the concentrates to be fed to live stock. And as most of the roughages have too large a proportion of carbohydrates and fat, it behooves the wideawake farmer to grow crops of grain with a good percentage of protein. It is interesting to see the total digestible protein per acre on all plots of cereals grown at this station since 1911: Peas, 359 pounds; oats, 223 pounds; two-row barley, 108 pounds; six-row barley, 89 pounds; wheat, 84 pounds. Next to oats, I should consider peas to be the cereal which should receive the most attention here.

It may be added that the pea, as a nitrogen gatherer from the air, would come in very well in rotations where it is impossible to have a large enough proportion of land under hoed crops.

EFFECT ON CROP OF VITALITY OF SEED.

When oats from the 1912 crop were tested, it was found that, owing to that very unfavourable season, the vitality was low. Though more seed was used to compensate for this, it was thought that the causes which had decreased the percentage of germination of the grain might have had an adverse influence on the rest which did germinate. But the results of 1913 show that we were wrong as far as this year is concerned anyhow. The following table explains the matter:—

Name of Variety.	Germination Test.	Seeds used per Acre.	1913.		1911-12-13.	
			Yield.	Position.	Yield.	Position.
	%	Bush.	Bush. Lb.		Bush. Lb.	
Gold Rain	68	3¼	75 30	1	69 4	1
Siberian	77	3	72 12	2	58 8	3
Ligowo (Swedish)	77	3	61 26	3	58 3	4
Twentieth Century	79	3	60 —	4	55 20	5
Thousand Dollar	80	2¾	44 4	5	45 20	6
Abundance (Garton's)	88	2¾	44 4	6	60 25	2
Daubeney	86	2¾	42 12	7	50 20	7

GRAIN GROWN FOR SEED.

Besides the trial plots, the following grain was grown to be sold or distributed as seed:—

Huron wheat, 1·81 acre; total yield, 3,150 lbs. or 1,740 lbs. = 29 bush. 0 lb. per acre.
Arthur Selected peas, 1·71 acre; total yield 2,778 lbs. or 1,625 lbs.=27 bush. 5 lbs. per acre.
Barley, Manchurian 1·62 acre; total yield 3,365 lbs. or 2,077 lbs. = 43 bush. 13 lbs. per acre.
Banner oats 10·89 acres; total yield 28,955 lbs. or 2,659 lbs. = 78 bush. 7 lbs. per acre.

The wheat and peas were sent to the Dominion Cerealist for the usual yearly distribution.

EXPERIMENTAL FARM, BRANDON, MAN.

W. C. McKILLICAN, B.S.A., SUPERINTENDENT.

The season of 1913 was a favourable one for the testing of cereal crops. That does not mean that it was a particularly good year for the production of heavy crops, but rather that it was nearly a normal Manitoba season, so that results obtained should be more valuable than those obtained in unusual or freakish seasons. The season opened with fine bright weather in the month of April, which gave an opportunity to get grain sown in good condition. Cool weather in May made rather slow germination. June and July were very dry, with a total rainfall for the season up to July 31 of only 5·33 inches. August brought some heavy rainstorms which lodged the oats. The latter part of August and all September were excellent harvest weather.

TEST OF VARIETIES.

The usual tests of varieties of cereal crops were conducted again this season. In order to lessen the danger of error, due to variation in the soil and other local causes, two plots were sown of each variety. The order of the plots was arranged so as to have each variety affected equally by any difference in soil between one side of the field and the other. The average yield of the two plots was used in computing the yield per acre. All plots were one-fortieth of an acre in area.

SPRING WHEAT.

Four named varieties of spring wheat were tested. They were sown on April 22, at the rate of 1½ bushels per acre. The land was sandy loam, and was summer-fallowed the previous year. The season was favourable for a really fair test of the varieties; it was nearly normal, but rather dry in the earlier months. The following results were obtained:—

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of straw on a scale of 10 points.	Rust.	Average Length of Head	Yield of Straw per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.			Inches.	Lb.	Bush.	Lb.	Lb.
1	Marquis (Bald)	Aug. 12	112	44	10	Almost none	3	3,860	50	30	62
2	Garton's No. 46 (Bearded).... ...	" 17	117	46	9	Medium	4	4,420	50	..	61
3	Red Fife (Bald)....	" 19	119	46	10	Almost none	3·5	4,520	45	..	61
4	Prelude (Bearded)..	" 3	103	35	8	Almost none	1 7	1,820	26	53	63

Marquis has again proved its superiority in earliness and productiveness. Garton's No. 46, while a heavy yielding sort, is no better than Marquis in that regard, and is distinctly inferior to it in milling quality, in strength of straw, and in being bearded

and of mixed type. Prelude is not recommended for Manitoba, except in the extreme north. It is very early, but is a light yielder, very short in the straw and bearded. Red Fife and Marquis are recommended for general use in Manitoba.

FIVE-YEAR AVERAGES.

The following are the average results obtained with Marquis and Red Fife during the past five years, and of the other two varieties during the years they have been under test:—

Variety.	Average No. of days maturing.	Average yield per acre.	
		Bush.	Lb.
Marquis	105·6	43	58
Red Fife	111·2	40	54
Garton's No. 46 (average 2 years)	.....	41	40
Prelude (average 3 years)	.....	23	21

In addition to the four varieties reported upon, ten new varieties recently produced by the Dominion Cerealist were tested under numbers. No public report will be made on these until they are more thoroughly tested; and probably most of them will be discarded, as soon as it is found out definitely which are the best. This year's test does not indicate that any of them would equal Marquis for this section of Manitoba.

STRAINS OF RED FIFE.

A comparison of various strains of Red Fife obtainable in the province was made this year. Seed was obtained from seed houses, and also from farmers who are well known as seed growers and winners of prizes on Red Fife, in important contests.

These strains were sown under the same conditions as the varieties already described. The results showed only a slight difference in productiveness, but considerable variation in earliness, and a most decided difference in purity. The following table shows the results:—

Strain.	No. of days maturing.	Rust.	Yield per acre.		Number of Foreign Heads per Ten Thousand.
			Bush.	Lb.	
Dow Bros. "Registered"	114	Almost none	40	10	0
Experimental Farm	112	"	40	40	3
Steele Briggs "Early Red Fife"	111	Medium	41	10	4
Thos. Thompson's "Registered"	115	Almost none	40	50	4
W. H. English's "Registered"	114	"	41	30	10
McKenzie's "Gold Standard"	115	A little	39	30	11
W. A. A. Rowe's "Registered"	114	Almost none	42	10	29
W. Laughland's "Prizewinning"	115	"	40	50	56
J. T. Maynard's "Prizewinning"	113	"	40	40	155

OATS.

Seventeen varieties of oats were tested this year. They were grown on black loam, summer-fallowed the previous year. They were sown on May 9 in duplicate plots at the rate of 2½ bushels per acre. The following are the results:—

OATS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening	Number of Days Maturing.	Average Length of Straw, including head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Straw per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Ligowo	May 9..	Aug. 18.	101	50	3	8	5,380	121	1	40
2	Daubeney	" 9..	" 3.	86	52	6	7	4,100	120	5	35
3	Twentieth Century.	" 9..	" 18.	101	40	4	8	5,140	117	17	39
4	Orloff, selected yellow	" 9..	" 01.	84	40	8	6	3,440	115	25	32
5	Improved American	" 9..	" 19.	102	53	4	8	5,500	112	2	38
6	Siberian	" 9..	" 18.	101	50	4	8	5,320	110	20	38
7	Newmarket	" 9..	" 18.	101	50	4	8	4,320	110	15	39
8	Gold Rain (Yellow)	" 9..	" 16.	99	53	6	8	5,240	109	19	42
9	Banner	" 9..	" 19.	102	52	4	8	5,220	109	14	40
10	Irish Victor	" 9..	" 18.	101	52	4	8	4,940	109	9	39
11	Victory	" 9..	" 19.	102	55	4	7	5,560	108	33	42
12	Thousand Dollar	" 9..	" 18	101	50	4	8	5,080	108	8	39
13	Swedish Select	" 9..	" 18.	101	50	4	8	4,180	103	3	38
14	Garton's No. 22	" 9..	" 18.	101	50	4	8	5,060	99	14	38
15	O. A. C. No. 72	" 9..	" 22.	105	54	5	9	4,800	94	14	39
16	Abundance Gartons Regenerated	" 9 .	" 17.	100	52	4	8	4,480	91	31	38
17	Victor (Black). ..	" 9.	" 19.	102	62	5	12	5,200	87	32	36

These results are somewhat unusual in several particulars. Daubeney and Orloff, two early varieties that usually yield about the least, are this year among the best. This is probably due to the fact that they were cut before a bad storm which knocked down the later varieties, preventing them from filling to the best advantage and making considerable shelling unavoidable at harvest time. Improved American and Banner, which are probably the same variety, do not hold their usual place at the top this season, but have nevertheless given large yields, and on account of their thin hulls and high average yields, are recommended as the best for general use. O. A. C. No. 72 is the only new variety added to the test this year. It was obtained from Professor Zavitz of the Ontario Agricultural College. The plot gave great promise of a heavy yield, but on account of being rather late, suffered about the worst from the effects of the storm, so that while the yield obtained is good, it is comparatively low in the list.

Eleven of these varieties have been under test for five years or more, two others have been tested four years, and three for two years. The average results for these periods are as follows:—

FIVE-YEAR AVERAGES.

Variety.	Average number of days Maturing.	Average strength of straw.	Average Yield per acre.	
			bush.	lb.
Improved American	101·2	Fairly stiff	102	32
Twentieth Century	101 4	Medium	101	15
Banner	100 6	Fairly stiff	100	30
Swedish Select	100·8	Medium	97	19
Siberian	100 4	Fairly stiff	96	22
Thousand Dollar	101	Medium	96	14
Irish Victor	100·8	Fairly stiff	95	29
Ligowo	1·1	Rather weak	92	5
Orloff	91	Stiff	88	29
Regenerated Abundance	101	Fairly stiff	88	17
Daubeney	92 2	Stiff	81	31
Victory (average of 4 years)		Fairly stiff	98	12
Gold Rain (average of 4 years)		Fairly stiff	96	15
Newmarket (average of 2 years)		Fairly stiff	105	7
Victor (average of 2 years)		Fairly stiff	94	9
Garton's No. 22 (average of 2 years)		Fairly stiff	85	20

INFLUENCE OF LOCATION ON SEED OATS.

In co-operation with two of the American Experiment Stations, an experiment is being tried to compare the results obtained in changing seed from one part of the continent to another. The seed all came originally from the same source. One lot was grown in Wisconsin, one in Ohio, and one in Brandon, in 1912. When sown side by side in 1913, the following results were obtained:—

Variety.	Date of Sowing	Date of Ripening.	Number of days Maturing.	Average length of Straw including Head.	Strength of Straw on a Scale of 10 points.	Average length of Head.	Yield of Straw per Acre.	Yield of Grain per Acre.	Weight per measured Bushel after cleaning.
				Inches.		Inches.	Lb.	Bush. Lb.	Lb.
Swedish Select (Brandon)	May 9	Aug. 18.	101	50	4	8	4180	103 3	38
Swedish Select (Ohio)	" 9	" 18.	101	50	6	8	4040	80 30	38
Swedish Select (Wisconsin)	" 9	" 18.	101	50	6	8	3810	76 26	38

SIX-ROW BARLEY.

Ten varieties of six-row barley were tested in uniform duplicate test plots. They were sown on May 14 at the rate of 2 bushels per acre. The land is black loam, and grew potatoes the previous year.

SIX-ROW BARLEY.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Straw per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
					Inches.		Inches.	Lbs.	Bush.	Lb.	Lb.
1	Mensury	May 14.	Aug. 8.	86	35	6	2·7	4,110	81	42	47
2	Garton's No. 68	" 14.	" 7.	85	36	6	2·7	4,120	79	38	49
3	Silver King	" 14.	" 6.	84	36	7	2·7	3,880	72	24	52
4	Manchurian	" 14.	" 11.	89	41	8	3·5	3,890	70	30	49
5	O. A. C. No. 21	" 14.	" 7.	85	38	9	3·5	3,880	68	31	50
6	Odessa	" 14.	" 9.	87	33	9	2·5	3,660	60	5	50
7	Yale	" 14.	" 9.	87	39	6	2·5	3,820	55	20	50
8	Mansfield	" 14.	" 9.	87	36	10	2·5	3,660	54	28	51
9	Guymalaye (Hull-less)	" 14.	" 8.	86	32	7	2·7	2,480	47	14	62
10	Success (Beardless)	" 14.	" 4.	82	35	9	2·7	2,440	46	37	47

Mensury is the old standby in Manitoba and is hard to crowd out of first place. Garton's No. 68 and Silver King are new varieties that seem to possess decided merit. Manchurian is Dr. C. E. Saunders' selection of Mensury; it has usually surpassed the original strain, but falls below it this year. It is nevertheless recommended on account of greater uniformity and better straw. O.A.C. No. 21, while down to fifth place this year, is still at the head on the five-year average. It is earlier than any other of the heavy yielding varieties, and has spendid stiff straw.

Five of these varieties have been grown for five years or more, one other has been grown three years, and the remainder two years. The average results for these periods are as follows:—

Variety.	Average No. of Days Maturing.	Average Strength of Straw.	Average Yield per Acre.	
			Bush.	Lb.
O. A. C. No. 21	85·8	Stiff	68	42
Mensury	86·8	Fairly stiff	67	02
Odessa	88·6	" "	63	47
Yale	87·4	Medium	61	22
Mansfield	87·4	Fairly stiff	59	44
Manchurian (average of 3 years)		" "	75	47
Garton's No. 68 (average of 2 years)		Medium	83	11
Silver King (average of 2 years)		"	73	16
Guymalaye (average of 2 years)		Fairly stiff	57	19
Success (average of 2 years)		" "	56	12

BRANDON.

TWO-ROW BARLEY.

Seven varieties of two-row barley were tested this year in uniform duplicate plots. They were sown on May 14, at the rate of 2 bushels per acre. The land is black loam, and grew fodder corn the previous year.

TWO-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening	No. of Days Maturing.	Average Length of Straw including head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of straw per acre.	Yield of Grain per acre.		Weight per measured bushel after cleaning
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Gold	May 14	Aug. 13	91	30	5	3.2	3,370	80	45	53
2	Hannchen	" "	" 12	90	32	5	3.0	3,430	80	25	53
3	Swedish Chevalier	" "	" 18	96	39	1	3.2	4,020	67	44	47
4	Canadian Thorpe	" "	" 15	93	36	8	3.2	3,315	66	40	51
5	Brewer	" "	" 17	95	37	2	3.0	3,970	66	22	49
6	Clifford	" "	" 8	86	38	9	3.5	3,600	59	38	48
7	Beaver	" "	" 9	87	45	10	4.5	3,350	48	31	46

The two-row barleys as a class compare more favourably than usual with the six-row. They are usually later, lighter yielding, and more inclined to lodge. Two Swedish varieties, Gold and Hannchen, have given much the best results this year.

Four of these varieties have been grown for five years or more, one for four years, and the other two for two years. The average results for these periods are as follows:—

Variety.	Average No. of Days Maturing.	Average strength of Straw.	Average Yield per acre.	
			Bush	Lb.
Canadian Thorpe	93	Fairly stiff	64	5
Swedish Chevalier	95.6	Very weak	59	14
Clifford	88.6	Fairly stiff	55	38
Beaver	91 2	Fairly stiff	51	31
Hannchen (average of 4 years)		Rather weak	70	26
Gold (average of 2 years)		Rather weak	72	46
Brewer (average of 2 years)		Weak	69	43

FIELD PEAS.

Nine varieties of field peas were tested this season. They were sown on April 22, in sandy loam, summer-fallowed the previous year. The following results were obtained:—

FIELD PEAS.—Test of Varieties.

Number.	Name of variety.	Size of Pea.	Date of Sowing	Date of Ripening.	Number of days Maturing.	Average length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after Cleaning.
						Inches.	Inches.	Lbs.	Bush.	Lb.	Lb.
1	Mackay	Medium	April 22	Aug. 26	126	52	2	3,300	55	—	63
2	Prussian Blue	"	"	" 25	125	54	2	3,275	54	35	62
3	Prince	"	"	" 27	127	48	2	3,255	54	15	62
4	Paragon	"	"	" 27	127	52	2	3,200	53	20	63
5	Solo	"	"	" 24	124	50	2·7	3,020	50	20	61
6	Arthur (Selected)	Large	"	" 22	122	36	2·7	2,915	48	35	63
7	Arthur	"	"	" 24	124	40	2·2	2,885	48	5	62
8	English Grey	Medium	"	" 27	127	53	2·2	2,710	45	10	61
9	Chancellor	Small	"	" 24	124	48	1·7	2,625	43	45	62
10	Golden Vine	Small	"	" 24	124	54	1·7	2,510	41	50	63

For a heavy yielding variety, Mackay is recommended. For an early short-strawed variety, Arthur, especially the selected type, is recommended.

FIVE-YEAR AVERAGES.

Eight of these varieties have been grown for five or more years, the other two have been under test three years. The following are average results for these periods:—

Variety.	Average No. of Days Maturing.	Average Yield per Acre.	
		Bush.	Lb.
Mackay	121·0	43	41
Prince	122·2	42	46
Paragon	122 0	40	29
Arthur	120 4	39	18
Golden Vine	124·6	38	41
English Grey	12›·2	38	25
Prussian Blue	120 0	38	4
Chancellor	119·8	36	12
Solo (average of 3 years)	....	48	3
Arthur Selected (average of 3 years)	...	40	12

FIELDS OF SEED GRAIN.

Fields of several varieties of pure seed grain were grown for the purpose of supplying the Dominion Cerealist with seed for free distribution, and to have a supply for use on the Farm, and to sell small quantities to Manitoba farmers. The following were the lots grown:—

BRANDON.

WHEAT.

Variety.	Preparation of Land.	Area.	Yield per Acre.		Total Yield.	
		Acres.	Bush.	Lb.	Bush.	Lb.
Marquis	Summer-fallow	5	39	..	145	..
Marquis	" "	2¼	40	27	91	..
Prelude	" "	⅓	19	4	12	38
No. 522B	" "	⅓	28	48	21	36
No. 523D	" "	¾	31	52	23	54
No. 195F	" "	1	25	41	25	41

OATS.

Variety.	Preparation of Land.	Area.	Yield per Acre.		Total Yield.	
		Acres.	Bush.	Lb.	Bush.	Lb.
Banner	Summer-fallow	6	100	30	603	00
Regenerated Abundance	" "	2	73	..	146	..
Daubeney	" "	2	75	..	150	..

BARLEY.

Variety.	Preparation of Land.	Area.	Yield per Acre.		Total Yield.	
		Acres.	Bush.	Lb.	Bush.	Lb.
Manchurian	Flax land	4	56	..	230	..
475A	Summer-fallow	1/5	67	19	13	23
461A	" "	1/11	57	3	5	9
465B	" "	1/11	62	41	5	27
465C	" "	1/11	33	44	3	4
471D3	" "	1/8	26	..	3	12
Success	" "	3/4	24	28	18	21

In addition to this a number of fields of Red Fife wheat and O. A. C. No. 21 barley suitable for seed purposes are grown on the land devoted to the rotation experiments. These are reported under the Division of Field Husbandry.

SEED GRAIN SOLD.

The following quantities of seed grain were sold to farmers, chiefly in Manitoba:—

Variety.	Number of Bushels Sold.	Number of Farmers who Purchased.
Marquis Wheat	306½	37
Red Fife Wheat	394	17
Banner Oats	39½	6
Abundance Oats	5	1
Daubeney Oats	33¼	6
O. A. C. No. 21 Barley	112	24
Manchurian Barley	24	4

In addition, a carload was sent to Ottawa to be used for the free distribution.

BRANDON.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

T. J. HARRISON, B.S.A., SUPERINTENDENT.

THE SEASON.

The season of 1913 was, on the whole, favourable for the production of good cereal crops in southern Saskatchewan. The spring opened up with the land in a fine state of tilth, and seeding commenced about April 14. There were a few light showers during May, and in June 4·37 inches of rain fell.

This, with 4·13 inches in July, gave the grain plenty of moisture during the growing period, and a fairly rank growth was the result.

With the exception of a bad electrical and wind storm on August 15, which lodged the heavy grain, the weather was ideal for ripening the crop. The most of it was harvested before September 3. The month of September was fine and dry, and a large percentage of the crop was threshed before the rain and snow came in October.

During the past season, tests were made of the following field crops: Thirteen varieties of spring wheat, twelve varieties of oats, nineteen varieties of barley, ten varieties of field peas, eight varieties of flax, and twenty-six varieties of potatoes.

SPRING WHEAT.

A variety test of spring wheat was conducted on one-fortieth acre plots located on a uniform soil which was summer-fallowed the previous year. These plots were sown on April 21, and cut between August 10 and September 2. Four named varieties and nine of Dr. Saunders' numbered cross-breds were under test. Only the named sorts are mentioned here.

SPRING WHEAT.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
				Inches.		Inches.	Lb.	Bush. Lb.	Lb.
Marquis	April 21	Aug. 26	127	44	10	3	3,400	56 40	64
Pioneer (195 F)	" 21	" 25	126	42	8	3	1,840	30 40	63 5
Prelude	" 21	" 10	111	35	9	2	1,600	26 40	64
Red Fife	" 21	Sept. 2	134	49	10	3·2	2,360	39 20	63

WHEAT—IN FIELD LOTS.

Field tests of the named varieties were made on both summer-fallow and stubble land. The Registered Marquis is the product of a plot sown with Special Registered Marquis supplied by Dr. Saunders in 1912. The Marquis is the progeny of seed supplied to the Farm in 1907. The Prelude in these tests had a tendency to shell badly if allowed to become perfectly ripe. It would seem necessary to cut slightly on the green side to overcome this.

SPRING WHEAT.—Field Lots.

Name of Variety.	Acres.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches.	Inches.	Lb.	Bush. Lb.	Lb.
Prelude	10	April 26	Aug. 5	101	34	2·2	1,521	25 21	63
"	¾	May 16	" 18	91	39	2·2	1,680	26 40	64
Reg. Marquis (Fallow).	11	April 17	" 25	130	43	2·7	2,685	44 45	63
Reg. Marquis (Fallow).	5	" 15	" 29	136	44	2·7	2,840	47 20	62 5
Marquis (Stubble)	5	" 23	" 28	127	41	3	2,446	40 46	62 5
Reg. Marquis (Fallow).	3	" 18	" 25	129	44	2·7	3,163	52 43	63
Marquis (Stubble)	10	" 25	" 25	122	38	3	1,969	32 49	62
Reg. Marquis (Fallow).	5½	" 18	" 12	116	41	3	2,686	44 46	62·5
Reg. Marquis (Fallow).	5½	" 18	" 12	116	37	2 5	2,528	42 8	62·5
Red Fife (Stubble)	6	" 21	" 22	123	40	3	2,337	38 57	62·5
" (Fallow)	6	" 16	Sept. 2	139	45	3	2,690	43 40	62
" "	6½	" 19	Aug. 27	130	42	2.5	2,228	37 8	62
" (Stubble)	6¼	22	" 27	127	40	2·5	1,680	28 ..	61

SPRING WHEAT—FIVE YEARS' COMPARISON OF FIELD LOTS.

The average yield per acre and the time taken to mature of two varieties of wheat grown in field lots under similar conditions for the past five years, are given below:—

Variety.	Average Days to mature.	Days earlier than Red Fife.	Average Yield per acre.	
			Bush.	Lb.
Red Fife	135·6		39	17
Marquis	126·8	8·8	44	51
Prelude (2 years)	102·5	23	34	29

OATS.

Ten varieties of oats were tested in the regular one-fortieth acre plots this season. The seed was sown on May 5 and 6 at the rate of 2 bushels of seed per acre, and the crop was harvested from August 10 to September 3. The land was summer-fallowed the previous year and produced a rank growth of straw, so rank that the oats all lodged, making them very difficult to harvest, and greatly affecting the yield.

One reason why Eighty Day yielded so high was due to its early maturing habit. It was ripe before the storms lodged the other varieties.

INDIAN HEAD.

OATS.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
Abundance	May 5	Aug. 31	118	50	6	9	3,040	89	14	36
Banner	" 5	" 31	118	50	8	8·5	3,520	103	18	37
Danish Island	" 5	" 30	117	50	9	8	4,680	137	22	39
Daubeney	" 5	" 24	111	43	6	7	3,720	109	14	38
Eighty Day	" 6	" 10	96	42	7	6	4,360	128	8	38
Gold Rain	" 6	" 25	111	52	9	8·5	4,280	125	30	42·5
Ligowo, Swedish	" 6	" 31	117	52	8	8·5	3,720	109	14	40·5
Siberian	" 6	Sept. 3	120	53	9	9	3,720	109	14	40
Swedish Select	" 6	Aug. 30	116	45	8	8	3,680	108	8	41
Thousand Dollar	" 6	" 28	114	51	9	8	3,440	101	6	41·5
Twentieth Century	" 6	" 28	114	49	8	6·5	3,680	108	8	41·5
Victory	" 6	" 28	114	49	9	7	3,760	110	20	40

OATS—FIELD TESTS.

Three varieties of oats were grown in the field. These were sown between May 4 and 7 and were ripe between August the 15th and 25th.

OATS.—Field Tests.

Variety.	Size of Field.	Preparation of Soil.	Days to mature.	Yield per Acre.		Weight per Bushel
	Acres.			Bush.	Lb.	Lb.
Banner	5	Summer fallow.	110	81	13	40·5
Abundance	8	"	102	49	19	42·5
Ligowo, Swedish	5	"	109	62	13	42·0

BARLEY—SIX ROW.

In the uniform plots, seven named varieties and three of the Dominion Cerealist's numbered sorts were tested. The plots were one-fortieth of an acre in size. The land had been summer-fallowed the previous year. This made the growth of straw very rank, and many of the varieties lodged. The seed was sown on May 2 and 3 at the rate of 2 bushels per acre and was harvested between August the 8th and 18th. The named varieties are reported on in the following table:—

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
				Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
Mansfield	May 2	Aug. 6	96	40	8	3½	3,240	67	24	51
Manchurian	" 2	" 7	97	45	9	3¾	3,520	73	16	48
O.A.C. No. 21	" 2	" 7	97	43	8	2¾	4,480	93	16	48
Oderbruch	" 2	" 6	96	36	7	2¼	3,560	74	8	51
Stella	" 2	" 6	96	41	7	2¾	3,840	80	—	49½
Trooper	" 2	" 6	96	42	9	2¼	3,880	80	40	47½
*Success (beardless)	" 3	July 30	86	41	10	3	2,732	56	44	48

* ¼ of an acre.

BARLEY—TWO-ROW.

In the variety tests of this type there were nine sorts. The plots were one-fortieth of an acre in size and the land had been summer-fallowed the previous year. These had a tendency to produce a long weak straw which lodged badly with the wind. The seed was sown at the rate of 2 bushels per acre on May 2, and the crop was harvested between August the 5th and 13th.

Two-row Barley.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of straw including head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
				Inches.		Inches.	Lb.	Bu. Lb.	Lb.
Canadian Thorpe	May 2	Aug. 8	98	41	9	2·7	3,280	68 16	50
Clifford	" 2	" 8	98	44	6	3·5	3,240	67 24	50·5
Danish Chevalier	" 2	" 9	99	36	6	4	3,440	71 32	49·5
Early Chevalier	" 2	" 5	95	41	7	3.5	3,680	76 32	53·5
Hannchen	" 2	" 7	97	36	7	3	3,760	78 16	51·5
Invincible	" 2	" 13	103	44	6	3·2	2,720	56 32	51
Standwell	" 2	" 13	103	42	9	2·7	2,680	55 40	52
Gold	" 2	" 13	103	36	9	3·5	3,800	79 8	50
Swedish Chevalier	" 2	" 13	103	37	7	3·7	3,680	76 32	52

BARLEY—FIELD LOTS—TEST OF VARIETIES.

Field tests were made of two six-row and one two-row varieties. The seed was sown on April 30 and May 1, and the crop was harvested on August 13 and 14. Manchurian is a very promising barley, but shelled badly with the wind storms.

BARLEY—FIELD LOTS.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of straw including head.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
				Inches.	Inches.	Lb.	Bu. Lb.	Lb.
Manchurian (six-row)	May 1	Aug. 5	96	48	2·7	2,963	61 35	48
Manchurian "	" 1	" 5	96	50	2·5	2,672	55 32	48
Manchurian "	April 29	" 12	105	50	3	2,644	55 4	50
Manchurian "	" 29	" 9	102	47	3·2	2,072	43 8	49
O.A.C. No. 21 "	" 30	" 7	99	45	2·5	2,542	52 46	51
Canadian Thorpe (2 row)	May 1	" 10	101	45	3	2,378	49 26	52

WINTER WHEAT.

A small field of winter wheat was sown on September 10, 1912. The exposed portion of the field winter-killed completely. A small part that was sheltered by the trees came through in good condition and was harvested August 13, 1913, yielding at the rate of 32 bushels per acre.

Indian Head.

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Winter Rye, Indian Head, Sask.

Cereal plots, Indian Head, Sask.

WINTER RYE.

A field of 1¾ acres was sown to winter rye on September 12, 1912. This came through the winter in excellent condition, and produced a good growth of straw. It was ripe and harvested on July 31, 1913. The yield per acre was 37 bushels and 40 pounds.

FLAX.

Eight varieties of flax were under test on the regular plots. The North Dakota varieties are supposed to be wilt resistant. The plots were sown on May 8, and harvested between August 28 and September 4.

FLAX.—Test of Varieties.

NAME OF VARIETY.	Date of Sowing.	Date of Ripening.	Number of days Maturing	Average Length of Plants.	Yield of Seed per Acre.	Yield of Seed per Acre.	Weight per measured bushel after Cleaning.
				Inches.	Lb.	Bush. Lb.	Lb.
Premost	May 8	August 28	112	30	1,800	32 — 8	55
North Dakota, "R" 114	" 8	" 30	114	30	1,640	29 — 16	55
North Dakota, "R" 73	" 8	Sept. 1	116	30	1,720	30 — 40	54·5
North Dakota, "R" 52	" 8	" 1	116	29	1,760	31 — 24	54·5
Nova Rossick	" 8	" 4	119	26	1,680	30 —	53
White Flowering	" 8	" 1	116	26	1,800	32 — 8	55
La Plata	" 8	" 1	116	18	1,600	28 — 32	55
Russian	" 8	August 30	114	35	1,240	22 — 8	55

FLAX—FIELD LOTS.

As Premost flax had done so well previously, only this variety was sown in the field.

NAME OF VARIETY.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Plants.	Yield of Seed per Acre	Yield of Seed per Acre.	Weight per measured bushel after Cleaning.
				Inches.	Lb.	Bush.	Lb.
Premost	May 8	Sept. 3	118	29	1,344	24	54
Premost	" 16	" 6	113	29	1,344	24	54·5

FIELD PEAS.

Ten varieties of peas were grown on the one-fortieth acre plots. These were sown on April 22, and harvested between August 26 and September 9.

PEAS.—Test of Varieties.

Name of Variety	Size of Pea.	Date of Sowing	Date of Ripening	Number of days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches.	Inches.	Lb.	Bush. Lb.	Lb.
Arthur	Large	April 22	August 26	126	52	2·5	2,200	36 40	65·5
Chancellor	Small	" 22	Sept. 1	132	80	2·7	2,320	38 40	65
English Grey	Large	" 22	" 9	140	56	2·2	2,560	42 40	63
Golden Vine	Small	" 22	" 1	132	65	2	2,280	38 .	65
Gregory	Medium	" 22	" 9	140	65	3	2,240	37 20	65·5
MacKay	Large	" 22	" 2	133	58	2·7	2,720	45 20	65
Paragon	Medium	" 22	" 9	140	70	2·5	2,840	47 20	65
Prince	Small	" 22	" 9	140	78	2·5	2,800	46 40	65
Prussian Blue	Medium	" 22	" 3	131	71	2·5	1,680	28 ..	64·5
Soto	"	" 22	August 29	129	65	2·5	2,600	43 20	63·5

FIELD LOTS OF PEAS.

Since early maturity is the important point in raising peas in this district, only the Arthur variety is grown in the fields.

Name of Variety	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches.	Inches.	Lb.	Bush. Lb.	Lb.
Arthur (backsetting)	Large	April 23	August 27	126	59	2	2,260	37 40	64
Arthur (summer fallow)	"	" 24	Sept. 10	139	78	2	1,912	31 52	64

SEED GRAIN.

A large portion of the Farm is devoted to the production of seed. Below is a summary of the amount produced this season:—

SUMMARY OF CROP PRODUCTION, 1913.

	Bush.	Lbs.
Spring wheat—		
Registered Marquis	1,348	35
Marquis	548	40
Red Fife	904	10
Prelude	273	35
Pioneer	44	..
Numbered sorts	154	..
Oats—		
Banner	2,205	14
Ligowo, Swedish	314	..
Abundance	396	21
Barley—		
Manchurian	1,671	34
O. A. C. No. 21	132	19
Canadian Thorpe	247	34
Flax—		
Premost	79	46
Peas—		
Arthur	350	40
Winter wheat	8	..
Winter Rye	66	..

SHIPMENT TO OTTAWA.

Seed of all the above crops is distributed in free samples by the Dominion Cerealist at Ottawa. To augment this supply a carload of seed is shipped to him from this farm. This season it consisted of: Wheat, 415 bushels; oats, 483 bushels; barley, 162 bushels; peas, 154 bushels.

SEED SOLD.

If a larger quantity of seed is required than that supplied from Ottawa it may be purchased from the Indian Head Farm, by farmers residing in southern Saskatchewan, in lots of 1 to 4 bushels. Last season the following quantities of grain were sold: Fall rye, 35 bushels; peas, 30 bushels; flax, 14 bushels; oats, 47 bushels; Prelude wheat, 24 bushels; Registered Marquis wheat, 111½ bushels; Red Fife wheat, 103 bushels; barley, 96 bushels.

In all 141 farmers were supplied with seed grain of the above crops.

FREE DISTRIBUTION.

Potatoes are distributed free from the Indian Head Farm in lots of three pounds to each applicant. Each recipient of a sample undertakes to test the potatoes on his farm, with a variety already grown, and report to the Superintendent in the fall. A large number of farmers take advantage of this offer. Last year 3,798 pounds of potatoes, including nineteen varieties, were sent out. This means that 1,266 farmers were supplied with new varieties of potatoes.

ACKNOWLEDGEMENTS.

I desire to express my appreciation and thanks to Angus MacKay, my predecessor; K. McBean, my assistant; John Waddell, my foreman; and Geo. Lang, my book-keeper, for their assistance in collecting and compiling the above data.

EXPERIMENTAL FARM, ROSTHERN, SASK.

WM. A. MUNRO, B.A., B.S.A., SUPERINTENDENT.

THE SEASON.

The season of 1913 was not so wet as either 1911 or 1912. Following is a table indicating the precipitation for each of the three seasons for the months of March to August:—

	1911.	1912.	1913
	Inches.	Inches.	Inches.
March	1·50	0·60	0·35
April	0·86	0·67	0·26
May	2·38	2·15	1·26
June	3·55	2·81	1·87
July	2·89	5·25	1·51
August	1·79	2·15	2·12
Total for season	12·97	13·63	7·37

CEREALS.

A number of varieties of cereals and peas were discarded in 1912, and a few new ones added. A study of the variety tests should be supplemented with a study of the precipitation during the seasons of 1912-13. Although there was 3 inches more rainfall in 1912 than in 1913, the crops in 1912 suffered severely from drought during the latter part of May and June, and then suffered from too much moisture during July and August. The crops of 1913, with less precipitation but with moisture more evenly distributed, did not suffer either from drought or excess of moisture. As a consequence, the crop of 1913 all over the west was of superior quality.

The following yields are for the named varieties of wheat grown on one-fortieth-acre plots under similar conditions. Despite our best efforts there are sure to be irregularities creep in. It is therefore better to judge the variety from a three-year average yield than from the yield of any one year. Such being the case we would judge Marquis quite superior to the others in point of yield. Added to this is the fact that it is earlier than most of the others and superior in milling qualities to some of them.

SPRING WHEAT.

Number.	Variety.	Number of days maturing.	Average length of straw.	Strength of straw on scale of 10 points.	Average length of head.	Yield per Acre. 1911.	1912.	1913.	3-Year Average
			Inches.	Inches.	Inches.	Bu. Lb.	Bu. Lb.	Bu. Lb.	Bu. Lb.
1	Bobs	124	36	10	3·5	62 ..	36 ..	57 20	51 46
2	Marquis	126	42	10	4	70 ..	43 20	54 ..	55 46
3	Red Fife (G. L. Smith)	125	38	10	3	60 ..	32 40	48 ..	46 53
4	Huron	128	40	10	3·5	73 20	40 40	45 20	53 6
5	Bishop	127	40	6	2·5	58 40	34 ..	42 40	45 6
6	Red Fife (Ottawa)	138	44	10	3·5	.....	16 40	37 20	.....
7	Kubanka (O. 2)	138	48	5	2·5	.....	.....	36 ..	.....
8	Early Red Fife	132	43	10	3·5	60 ..	27 20	36 ..	41 6
9	Pioneer (1915F)	123	40	10	3	.....	28 40	36 ..	.....
10	Yellow Cross	117	36	10	3	.....	16 ..	28 ..	.....
11	Preston	132	41	8	4·5	.....	34 ..	26 ..	.....
12	Prelude	98	33	10	2	.....	29 20	24 ..	.....
13	Kubanka (O. 1)	138	50	4	2·5	.....	.....	16 40	.....

Beside the uniform trial plots there were eight 2-acre plots of Marquis wheat grown under different conditions. The following table indicates the yield per acre from each of these plots:—

Rotation.	Fallow. 1912		Fallow. 1913		Stubble. 1912		Stubble. 1913		Average. 1912		Average. 1913	
	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
C	22	44	42	20	15	06	20	15	18	55	31	17
J	24	30	37	14	15	05	25	15	19	47	31	14
P	34	47	35	40	16	00	21	51	25	23	28	45
R	24	29	40	41	23	00	52	11	28	45	46	26

The average yield on 8 acres of fallow in 1912 was 26 bushels 40 pounds, and in 1913 was 38 bushels 59 pounds. The average on 6 acres of stubble in 1912 was 15 bushels 24 pounds and in 1913 was 22 bushels 27 pounds. This stubble had been fall ploughed. The yield per acre on 2 acres of corn ground in 1912 was 33 bushels and in 1913 was 52 bushels 11 pounds. The average under all conditions on 16 acres in 1912 was 23 bushels 12 pounds, and in 1913 was 34 bushels 25 pounds. It is rather significant that the average yield on corn stubble is higher than the average yield for the same years on summer-fallow.

The order of the rotation is: Summer-fallow manured in the fall; corn well worked throughout the season; and corn stubble spring ploughed and sown to wheat.

OATS.

Six acres of Banner oats on fall-ploughed wheat stubble yielded an average of 69 bushels and 26 pounds per acre in 1912, and 4 acres in 1913 yielded an average of 74 bushels and 19 pounds. Ten varieties of oats were tested in plots.

Number.	Variety.	No. of days maturing.	Average length of straw in inches.	Strength of straw on a scale of 10 points.	Average length of head in inches.	Yield per Acre.						3-Year average.	
						1911		1912		1913			
						Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Improved American	119	47	10	7.5	127	2	74	4	147	20	116	9
2	Banner	120	49	7	8	131	26	70	20	145	30	116	2
3	Victory	121	46	10	6	109	14	83	18	143	18	112	5
4	Abundance	119	42	8	7	125	30	94	4	132	32	117	22
5	Twentieth Century	121	42	6	6.5	128	8	68	8	132	32	109	27
6	Gold Rain	119	51	8	7	127	2	61	6	131	24	106	23
7	Thousand Dollar	120	50	9	7	116	6	80	..	115	10	103	31
8	Ligowo	119	45	8	6	121	6	69	14	108	8	99	20
9	Eighty Day	105	37	10	4.7	.....		63	18	102	12	.....	
10	Daubeney	105	33	10	5	101	6	68	8	98	28	89	11

BARLEY.

Manchurian yielded at the rate of 96 bushels 32 pounds per acre in 1911, and 55 bushels 40 pounds in 1912, but owing to a mishap at threshing the yield for 1913 could not be measured. It is similar in appearance and yield to O.A.C. 21. Two acres of O.A.C 21 on root ground yielded in 1912 at the rate of 45 bushels 27 pounds per acre, and in 1913 at the rate of 53 bushels 41 pounds.

Plot Tests of Barley.

Number.	Variety.	No. of days maturing.	Average length of straw in inches.	Strength of straw on a scale of 10 points.	Average length of head in inches.	Yield per Acre.						3-year average.	
						1911		1912		1913			
						Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Swan's Neck	105	41	5	3	78	16	66	32	74	8	75	3
2	O. A. C. 21	106	42	7	3	94	8	57	4	73	16	78	9
3	Duckbill	108	41	10	3	85	16	61	32	67	24	71	24
4	Early Chevalier	101	42	8	2.5	79	8	54	28	65	..	66	12
5	Black Japan	108	32	10	2	93	16	70	40	58	16	70	40
6	Sedish Chevalier	108	37	2	4.5	71	32	55	40	56	32	61	18
7	Taganrog	108	38	4	2.7	81	32	59	8	53	16	64	34
8	Stella	106	44	8	3.5	83	16	49	8	50	40	61	5
9	Odessa	105	41	9	3 5	100	40	44	8	46	32	63	41
10	Beaver	107	46	10	5	70	40	38	16	46	52	51	45
11	Success	96	38	10	3	.....		49	8	31	32	.....	
12	Early Indian	91	21	10	1.2	.....		.....	...	11	32	.....	..

PEAS.

Owing to the difficulty in threshing the peas with our machine, the table does not show the actual yield. The comparison, however, is approximately correct.

In 1912, when crops were so affected by early frost, the Arthur pea was the only one of the varieties that came to maturity sufficiently to be fit for seed the following spring. Besides being early it is one of the highest yielders.

VARIETY TESTS OF PEAS.

Number.	Name of Variety.	Number of days maturing.	Average length of straw.	Average length of pod.	Yield per Acre.						Three Year Average.	
					1911.		1912.		1913.			
			Inches.	Inches.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Golden Vine	128	60	1·5	24	40	31	20	23	20	26	26
2	Gregory	131	64	2·5	..	..	33	20	21	20	..	..
3	Wisconsin Blue	131	68	2·5	31	20	32	..	21	20	28	13
4	Chancellor	128	58	2	37	20	36	40	19	20	31	6
5	Arthur Selected	126	66	2	51	20	29	20	18	40	33	6
6	Prussian Blue	129	60	2·5	46	40	39	20	18	..	34	40
7	Black Eye Marrowfat	132	60	2·7	26	20	24	20	16	40	24	6
8	Mackay	129	62	2	48	..	37	20	16	40	34	..
9	English Grey	131	56	2	38	..	25	20	14	40	26	..
10	Paragon	131	54	2·2	48	..	43	20	13	20	34	53
11	White Marrowfat	131	66	2	48	..	43	20	11	20	34	13

EXPERIMENTAL FARM, SCOTT, SASK.

R. E. EVEREST, B.S.A., SUPERINTENDENT.

THE SEASON.

The nature of the season this year (as always) was a deciding factor in the quantity and quality of cereal crops produced.

Seeding was possible early in April and, with moisture in the soil and warmth from above, germination was timely and uniform. Following this condition, the weather was cool and the rainfall meagre. The small amount of precipitation at this time resulted in checking the growth of grain upon poorly cultivated land, to such an extent that it never fully recovered, and gave in consequence a low yield, while land that had been handled carefully was able to support its growing crop over this period, and with the later sunshine and showers went on to a harvest of fair yield and excellent quality of grain.

SPRING WHEAT.

Six named varieties of spring wheat were sown on the 11th of April at the rate of 1¾ bushel of seed per acre on land which had been summer-fallowed in 1912.

The seed went into a good seed bed and made a uniform start. Owing to rain being scant in the first part of season, and that warm weather with showers continued well into harvest, early-maturing varieties appear to a disadvantage with those that ripened at a later date.

SPRING WHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of sowing.	Date of ripening.	Number of days maturing.	Average length of straw, including head.	Strength of straw on a scale of 10 points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches.		Inches	Lb.	Bush. Lb.	Lb.
1	Marquis	April 11	Aug. 20	131	33·5	10	3·2	2,080	24 40	64·0
2	Red Fife	" "	" 26	137	39	10	2·7	1,720	28 20	63·4
3	Huron Selected	" "	" 21	132	32	10	2·7	1,560	26 .	63·5
4	Alpha Selected	" "	" 20	131	35	10	2	1,440	24 20	62·5
5	Pioneer (195 F)	" "	" 14	125	34	10	2·5	1,200	20	63·1
6	Prelude	" "	" 7	118	29	10	2	960	16 ..	61·2

OATS—TEST OF VARIETIES.

Ten varieties of oats were sown on the 29th of April upon land which had been summer-fallowed the previous year. Seed was used at the rate of 2¼ bushels per acre. The seed germinated well and the crop maintained a consistent growth throughout the season. The variety Victory again has a decided advantage in yield and is worthy of special attention in this part of Saskatchewan.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Victory	April 29	Aug. 22	115	42	10	6·7	3,640	107	2	42·9
2	Twentieth Century.	" 29	" 21	114	43	10	7	3,360	98	28	41·2
3	Gold Rain	" 29	" 23	116	47	10	7·2	3,240	95	10	41·2
4	Thousand Dollar	" 29	" 21	114	43	10	7	3,000	88	8	43·0
5	Ligowo, Swedish	" 29	" 21	114	44	10	6·5	2,840	83	18	42·0
6	Tartar King	" 29	" 22	115	43	10	7	2,600	76	16	36·8
7	Banner	" 29	" 25	118	44	10	7	2,440	71	26	40·0
8	Abundance, Garton's Regenerated	" 29	" 25	118	41	10	6	2,400	70	20	40·5
9	Eighty Day	" 29	" 13	106	38	9·5	7	2,160	63	18	33·8
10	Daubeney	" 29	" 13	106	37	9	6·5	1,840	54	4	35·0

BARLEY—TEST OF VARIETIES.

Four varieties of six-row and two varieties of two-row barley were sown on April 29 at the rate of 2 bushels per acre on land which had been in summer-fallow in 1912. The yield of these varieties is very moderate, the return being much below what the appearance of the crop would indicate. This light harvest may be attributed to a want of appropriate rains at a critical time in the crops' development.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
	Six-row.				Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Black Japan	April 29	Aug. 20	113	36	10	2·2	1,800	37	24	43·8
2	O. A. C. No. 21	" 29	" 19	112	42	9·5	3·5	1,720	35	40	45·0
3	Manchurian	" 29	" 19	112	43	10	3·5	1,240	25	40	45·2
4	Success	" 29	" 7	100	31	10	2·7	780	16	12	47·3
	Two-row.										
1	Duckbill	" 29	" 22	115	36	9·5	3·5	1,900	39	28	51·0
2	Early Chevalier	" 29	" 12	105	43	9	4	1,780	37	4	51·5

PEAS—TEST OF VARIETIES.

Four varieties of peas were sown April 18, upon fallow land. Seed was used at the rate of 2½ bushels per acre. Two varieties, Prussian Blue and English Grey failed to fully mature and hardly merit, in consequence, the first and second place on the list in which their yield of grain places them. The crop from these two plots was only fit for feed. The noticeable feature of the pea crop was the heavy load of pods carried by a moderate amount of vine.

Number	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Size of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
						Lb.	Bush. Lb.	Lb.
1	Prussian Blue	Apr. 18	Sept. 5	140	Small	3,280	54 40	52·6
2	English Grey	" 18	" 5	140	Large	2,020	33 40	56·0
3	Golden Vine	" 18	" 4	139	Small	1,660	26 40	65·1
4	Arthur	" 18	" 4	139	Large	1,560	26 .	65·1

RYE.

A plot of fall rye was sown in September, 1912. This plot made a favourable start and went into the winter with a fair amount of top. The plants revived in a uniform manner on the opening of spring, and made a strong growth during the season.

A plot of spring rye was sown on April 11. In strength of growth and yield of grain this plot did not do so well as the fall sown variety.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Spring rye, Ottawa Select, 1912.	Apr. 11	Aug. 19	130	44	10	3¼	1,000	16 40	59·1
2	Fall rye, Common	Sept. 3	" 13	344	49	10	5	1,440	24 .	60·0

FLAX.

A plot of common flax was sown on May 16 at the rate of 30 pounds per acre on land which had been in summer-fallow the previous season. The growth of plants was somewhat light and the yield of seed low. The flax was ripe on September 17, the average length of the plants was 27 inches, the yield per acre was 17 bushels 8 pounds, and the weight per measured bushel was 51·2 pounds.

SCOTT.

SESSIONAL PAPER No. 16

SUMMARY OF GRAIN SUITABLE FOR USE AS SEED IN 1914.

Marquis wheat	374	bushels.
Ligowo oats	329	"
Manchurian barley	27	"
Arthur peas	75	"

GRAIN SOLD FOR SEED, 1914.

Grain.	Bush.	Number of Farmers supplied.
Oats—		
Ligowo	20 0	3
Banner	10 0	1
Barley—		
Manchurian	10 0	1
Peas—		
Arthur	21 3	5

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

W. H. FAIRFIELD, M.S., SUPERINTENDENT.

SEASONAL CONDITIONS.

The season of 1913 opened at about the usual time for the district. Winter grain, however, suffered, many areas in the winter wheat fields being badly injured owing to the high dry winds that prevailed. Spring seeding commenced early in April, germination was rapid, and a good stand was obtained in all cases. The rainfall during the spring was scant, especially during late May and early June. Crops of all kinds suffered acutely, particularly early-sown grain. The rainfall for the growing season was as follows:—

	Inches
April	0·52
May	1·70
June	4·70
July	1·29
August 1 to 15	1·22
Total	9·43

Although the precipitation for June was reasonably satisfactory, generous rains were not received till the 16th; from then to the end of the month moisture was abundant, 4·3 inches out of 4·7 inches for the month falling during this period. The late rain, however, stimulated a second growth which caused uneven ripening and thus materially reduced the yield and quality of both wheat and barley. The result with oats was better, the second growth being so strong and vigorous that it reached maturity before any serious loss was suffered from the shelling of the first growth. The rainfall over the southern part of the province was quite uneven, some localities being more favoured than others. One of the districts where the grain crops were the best was along the Aldersyde branch of the C.P.R. from Monarch and Carmangay.

As in past seasons, the varietal tests with the different grains have been carried on both with and without irrigation, and to avoid confusion the report is divided into two parts. The first deals with the part of the farm on which no irrigation is applied.

PART I.—NON-IRRIGATED, OR 'DRY' FARM.

EXPERIMENTS WITH WINTER WHEATS.

Winter killing was quite general with the winter wheats. In addition to the unfavourable climatic conditions during the winter, the plants were seriously affected with the disease quite generally prevalent in the winter wheat fields in the southern part of the province, the exact nature of which has not yet been definitely discovered. As in the past, the varieties of the Turkey Red type survived the unfavourable conditions best, although the yield was light. Eleven varieties of winter wheat were sown on summer-fallowed land on September 1, 1912.

(NON-IRRIGATED) WINTER WHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average length of Straw including Head.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
		1912.	1913.		Inches.	Inches.	Lb.	Bush.	Lb.	Lb.
1	Minnesota No. 561	Sept. 1	Aug. 3	336	37	3·5	2,220	37	..	62
2	Azima	" 1	" 3	336	29	3	1,560	26	..	62·5
3	Ghirka	" 1	" 1	334	34	3	1,440	24	..	63
4	Kansas Red	" 1	" 3	336	31	3	1,380	23	..	62
5	Buffum No. 17	" 1	" 1	334	37	3·5	1,380	23	..	61
6	Dawson's Golden Chaff	" 1	" 7	340	32	3·5	1,320	22	..	59·5
7	Minnesota No. 529	" 1	" 4	337	29	2	1,140	19	..	61·7
8	Kharkov	" 1	" 3	336	33	2	960	16	..	62·5
9	Tasmania Red (C.E.F.)	" 1	" 13	346	33	3	600	15	..	58
10	Egyptian Amber (C.E.F.)	" 1	" 13	346	36	3·5	810	13	30	58·5
11	Winter Emmer	Winter killed.								

EXPERIMENTS WITH SPRING WHEAT.

(Non-Irrigated.)

Sixteen varieties of spring wheat were tested. They were sown on backsetting. The yields in all cases were affected by the drought in late May and early June. The crop ripened unevenly on account of the second growth, and the quality of the grain produced was injured more or less by the presence of immature green kernels. Only the named varieties are reported upon.

Spring Wheat (Non-Irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days maturing.	Average Length of straw, including head.	Average Length of Head.	Yield of Grain per acre.	Yield of Grain per acre.		Weight per measured bushel after cleaning.	Average Yield per acre for 5 years.	
					Inches.	Inches.	Lb.	Bush.	Lb.	Lb.	Bush.	Lb.
1	Pioneer (I85 F)	April 3	Aug. 1	120	29	3	1,650	27	30	64	28	30[1]
2	Fobs	" 3	" 4	125	30.5	3.5	2,025	33	45	60	28	23[1]
3	Huron	" 3	" 5	124	36	3	2,453	40	53	60.7	28	11
4	Red Fife	" 3	" 6	125	37	4	1,860	31	—	59	27	59
5	Early Red Fife	" 3	" 5	124	36	3.5	1,661	27	41	58	27	19[1]
6	Early Russian	" 3	" 2	121	38	3.5	1,650	27	30	59	27	11
7	Preston	" 3	" 4	123	36	4	1,800	30	—	61.2	27	4
8	Stanley	" 3	" 2	121	37	3.5	1,920	32	—	59.7	26	20
9	Marquis	" 3	" 4	123	30	3	1,500	25	—	61.2	25	2
10	Marquis (Chemist)	" 11	" 5	116	37	3	1,740	29	—	61.2		
11	Kubanka	" 3	" 7	126	38	3	1,320	22	—	62.5		
12	Yellow Cross	" 3	July 31	119	27	3	1,219	20	19	63	20	25[1]
13	Prelude	" 3	" 31	119	22	2	735	12	15	63	15	8[1]

[1] Average for two years only.

EXPERIMENTS WITH OATS (Non-Irrigated).

Eleven varieties of oats were tested. They were sown on back-setting. The relatively high yields of oats as compared with wheat and barley grown under similar conditions is interesting. The reason for the larger yield is due to the fact that after the period of drought in the early part of the season the oats made a vigorous second growth, the result being a crop almost as heavy as if no setback had occurred. The date of ripening, however, was much later than it otherwise would have been. In the case of barley and wheat, this second growth was a detriment rather than a benefit to the crop.

OATS (NON-IRRIGATED).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days maturing.	Average Length of straw, including head.	Average Length of Head.	Yield of Grain per acre.	Yield of Grain per acre.		Weight per measured bushel after cleaning.	Average Yield per acre for 5 years.	
					Inches.	Inches.	Lb.	Bush.	Lb.	Lb.	Bush.	Lb.
1	Victory	April 10	Aug. 4	116	44	6	2,640	77	22	41	92	1
2	Improved American	" 10	" 4	116	41	6	2,820	82	32	37	72	6
3	Swedish Ligowo	" 10	" 6	118	39	6	2,380	67	2	38.2	68	22[1]
4	Irish Victor	" 10	" 4	116	42	6 5	2,850	83	28	38	64	2
5	Lincoln	" 10	" 6	118	46	7	2,291	67	13	38 7	63	25
6	Danish Island	" 10	" 4	116	39	6.5	2,490	73	8	36.7	63	6
7	Banner	" 10	" 5	117	37	5.5	2,490	73	8	36.5	61	26
8	Gold Rain	" 10	" 4	116	46	5.5	2,558	75	8	41	59	27[2]
9	Thousand Dollar	" 10	" 8	120	40.5	7	2,276	66	32	39.7	51	—
10	Danbeney	" 10	July 30	114	36	5.5	2,160	63	18	31.7	50	25[1]
11	Garton's Reg. Abundance	" 10	Aug. 5	117	39	6.5	1,860	54	24	38.7	50	11[2]

[1] Average for two years only. [2] Average for three years.

EXPERIMENTS WITH BARLEY (NON-IRRIGATED).

Seven varieties of six-row and four varities of two-row barley were tested. They were sown on back-setting. The yields were seriously affected by drought.

SIX-ROW BARLEY (NON-IRRIGATED).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing	Average Length of Straw, including Head.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.	Average Yield per Acre for 5 Years.	
					Inches.	Inches.	Lb.	Bush.	Lb.	Lb.	Bush.	Lb.
1	Claude	April 15..	Aug. 5..	111	26	2	1,920	40	..	45 5	35	22
2	Cole	" 15..	" 4..	110	28	2	1,920	40	..	41·2	35	15†
3	Odessa	" 15..	" 4..	110	29	3	1,920	40	..	48	33	10
4	Mansfield	" 15..	" 4..	110	29	2·5	1,680	55	..	47	32	29
5	Guymalaye	" 15..	July 30..	105	29	2	1,380	28	36	61·5	28	21†
6	Manchurian	" 15..	Aug. 1..	107	29	3	1,560	32	24	41 2	27	39†
7	O. A. C., No. 21	" 15..	July 28..	103	29	2 5	1,680	35	..	46	46	25*

† Average for two years only. * Average for three years.

LETHBRIDGE.

TWO-ROW BARLEY (NON-IRRIGATED).—Test of Varieties.

Number.	Name of Variety	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre		Weight per Measured Bushel after cleaning.	Average Yield per Acre for 5 Years.	
					In.	In.	Lb.	Bush.	Lb.	Lb.	Bush.	Lb.
1	Swedish Chevalier	April 15	Aug. 4	110	27	3·5	2,400	50	.	51	40	12
2	Invincible	" 15	" 5	111	33	3	2,280	47	24	49·7	38	3
3	Early Chevalier	" 15	" 1	107	42	3	1,890	39	18	51	31	24‡
4	Chifford	" 15	" 4	110	33	3	1,680	35	..	50	0	34

‡ Average for two years only.

EXPERIMENTS WITH PEAS (NON-IRRIGATED).

Nine varieties were tested. They were sown on backsetting. Although all of them suffered quite materially during the drought in the early part of the season they appeared to recover with the late rains so that the yields, considering the season as a whole, were good.

PEAS (NON-IRRIGATED)—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing	Date of Ripening.	Number of days Maturing.	Yield of Grain per Acre	Yield of Grain per Acre	Weight per measured bushel after cleaning.	Average yield per acre for 5 years.	
					Lb.	Bush.	Lb.	Bush	Lb.
1	Prussian Blue	April 8	Aug. 9	123	1,920	32	67.2	28	28
2	Prince	" 8	" 11	125	1,800	30	67.2	28	10
3	Picton	" 8	" 8	122	1,740	29	67	27	45*
4	Paragon	" 8	" 7	121	2,160	36	66.2	27	8†
5	English Grey	" 8	" 7	121	1,860	31	66	26	55
6	Mackay	" 8	" 11	125	2,040	34	66.5	26	30†
7	Arthur Selected	" 8	" 6	120	1,380	28	67	25	3
8	Golden Vine	" 8	" 6	120	1,380	23	67	24	36
9	Chancellor	" 8	" 7	121	1,920	32	67	24	22

* Average for four years only.
† Average for six years.

LETHBRIDGE.

EXPERIMENTS WITH RYE (NON-IRRIGATED).

One variety of spring rye and one variety of winter rye were tested. The former was sown on backsetting and the latter on summer-fallow.

EXPERIMENTS WITH RYE (NON-IRRIGATED).

Variety.	Date Sown.	Date Ripe.	Yield per Acre.		Average Yield per Acre for Two Years.	
			Bush.	Lb.	Bush.	Lb.
Spring rye	April 12, 1913	Aug. 23	20	20	19	46
Winter rye	September 1, 1912	July 2	30	9	31	34

FLAX.

Two varieties of flax were tested. They were both sown on backsetting. The size of the plots in each case was one-sixtieth of an acre.

FLAX (NON-IRRIGATED).

Variety.	Date Sown.	Date Ripe.	Number of Days Maturing.	Length of Plants.	Yield Per Acre.	Yield Per Acre.	
				Inches.	Lb.	Bush.	Lb.
Golden	May 12	Aug. 28	108	18	1,485	26	29
Common	May 16	Aug. 16	92	26½	1,170	20	50

BUCKWHEAT (NON-IRRIGATED).

Two varieties were sown on backsetting on June 2. They were both slightly frosted before ripening, but in 1912 very good results were obtained.

BUCKWHEAT (NON-IRRIGATED)—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.	Average yield per Acre for 2 Years.	
					Lb.	Bush.	Lb.	Lb.	Bush.	Lb.
1	Japanese	June 2	Sept. 15	105	840	17	24	47 7	21	42
2	Silver Hull	June 2	Sept. 15	105	600	12	24	49	17	39

LETHBRIDGE.

PART II—THE IRRIGATED FARM

EXPERIMENTS WITH SPRING WHEAT.

Seven varieties were tested. They were all sown April 4 on land on which roots had been grown the previous season. They were irrigated on July 25.

SPRING WHEAT (IRRIGATED)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.	Average Yield per Acre for 6 Years.	
				Inches.	Inches.	Lb.	Bush.	Lb.	Lb.	Bush.	Lb.
1	Pioneer (145 F)	Aug. 4	121	39	2	3,240	54	..	64·5	...	...
2	Marquis	" 5	122	43	3	3,131	52	11	63·7	44	37
3	Red Fife	" 6	123	48	3	2,719	45	19	59·7	43	56
4	Huron	" 5	122	43	3	3,052	50	52	61·2	43	49
5	Preston	" 5	122	46	4	3,220	47	.	62	43	13
6	Stanley	" 2	119	48	4	2,874	44	34	59·7	35	36
7	Prelude (135 B)	July 30	116	38	2	1,380	30	11	63·5	...	...

EXPERIMENTS WITH OATS.

Six varieties were sown on April 10 on land on which roots had been grown the previous season. They were irrigated on July 25.

OATS (IRRIGATED)—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.	Average Yield per Acre for 6 Years.	
					Inches.	Inches.	Lb.	Bush.	Lb.	Lb.	Bush.	Lb.
1	Garton's Reg. Abundance	April 10..	Aug. 4..	115	48	6	3,930	115	20	41	110	25*
2	Improv. American	" ..	" 4..	115	48	6	4,193	132	5	40	101	32
3	Irish Victor	" ..	" 4..	115	37	6	4,165	131	1	40.5	97	21
4	Banner	" ..	" 4..	115	47	5	3,911	115	1	41	96	23
5	Danish Island	" ..	" 5.	116	47	6	4,176	123	3	40	95	23
6	Daubeney	" ..	July 28..	109	32	5	3,480	102	12	35.5	...	...

*Average for two years only.

LETHBRIDGE.

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EXPERIMENTS WITH BARLEY.

There were seven varieties of six-row and four varieties of two-row barley tested. They were sown April 15 on land on which roots had been sown the previous season and were irrigated once on July 25.

SIX-ROW BARLEY (IRRIGATED)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.	Average Yield per Acre for 6 Years.	
				Inches.	Inches.		Bush.	Lb.	Lbs.	Bush.	Lb.
1	Cole	Aug. 11	118	35	2	4,830	100	30	48	..	..
2	O.A.C. No. 21	" 2	109	37	2	4,260	88	36	51	79	38*
3	Claude	" 4	111	35	2	4,500	93	36	49 5	70	21
4	Manchurian	" 1	108	41	3	3,548	73	44	51	64	27*
5	Odessa	" 2	109	34	2	4,369	91	.	51 5	62	1
6	Mansfield	" 2	109	37	2	4,035	84	3	53	58	11
7	Guymalaye	July 30	105	26	2	3,270	68	6	64 7	..	..

*Average for three years only.

TWO-ROW BARLEY (IRRIGATED)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, including Head.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.	Average Yield per Acre for Five Years.	
				Inches.	Inches.	Lb.	Bush.	Lb.	Lb.	Bush.	Lb.
1	Swedish Chevalier	Aug. 10	117	36	2	4,470	93	6	53 2	70	35 (1)
2	Invincible	" 5	112	35	2	4,530	94	18	54	60	46
3	Early Chevalier	" 21	128	41	3	3,293	68	29	53	60	34 (2)
4	Clifford	" 1	108	41	2	3,120	65	..	53 7	45	6

(1) Average yield for six years.
(2) Average yield for two years only.

LETHBRIDGE.

EXPERIMENTS WITH PEAS.

Ten varieties were sown April 8 on land on which hoed crops had been grown the previous year. They were irrigated once on July 25.

PEAS (IRRIGATED)—Test of Varieties.

Number	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.	Average Yield per Acre for Six Years.
				Lb.	Bush. Lb.	Lb.	Bush. Lb.
1	Paragon	Aug. 11	125	2,940	49 ..	66·2	44 ..
2	Arthur	" 6	120	2,220	37 ..	68	43 . (1)
3	Mackay	" 19	133	2,782	46 22	66 2	41 11
4	Prince	" 11	125	2,220	37 ..	67·2	38 15
5	English Grey	" 9	123	2,640	44 ..	66	37 17
6	Picton	" 11	125	2,430	40 30	67 7	36 38
7	Golden Vine	" 11	125	2,940	49 ..	67 5	34 13
8	Prussian Blue	" 11	125	2,520	42 ..	67·5	33 15
9	Chancellor	" 9	123	2,820	47 ..	67·2	32 23
10	White Marrowfat	" 11	125	1,650	27 30	67·2	26 4 (2)

(1) Average for two years only.
(2) Average for five years.

Peas are a crop that should be grown more extensively on irrigated land and, for that matter, they are an excellent crop for the dry farm. We are free so far from the weevil, and there is a brisk demand for seed each spring at good prices. It is quite probable that on land on which they have never been grown that the yield can be materially increased by inoculation.

BUCKWHEAT.

Two varieties of buckwheat have been tested for two years. Both varieties were frosted this year before they ripened, and the yield was light, although in 1912, good results were obtained on both the irrigated and the dry land. They were both sown June 2, on land on which hoed crops had been grown the previous season. They were irrigated once on July 25.

BUCKWHEAT (IRRIGATED).—Test of Varieties.

Number	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Yield of Grain per Acre.	Yield of Grain per Acre	Weight per Measured Bushel after Cleaning.	Average Yield per Acre for 2 Years.
				Lb.	Bush. Lb	Lb.	Bush. Lb.
1	Japanese	Sept. 15	105	720	15 ..	49	30 ..
2	Silver Hull	Sept. 15	105	540	11 12	51	27 24

LETHBRIDGE.

EXPERIMENTAL FARM, LACOMBE, ALTA.

G. H. HUTTON, B.S.A., SUPERINTENDENT.

The seeding season of 1913 opened at the Lacombe Station on April 10 when the first wheat plots were sown. The weather during April, and for the first ten days of May, was both cool and dry, keeping growth in check, but after May 10 conditions were so favourable for growth that by June 15 all crops on well-prepared land were as far forward as on any previous season since this Station was established. Favourable weather continued throughout the summer and until harvest and threshing were concluded. The precipitation for May, June, and July was 6·89 inches, and while the mean temperature varied little from that of previous years, no low temperatures were experienced. Taken altogether, therefore, the season of 1913 in Central Alberta was quite favourable for the production of fair yields of grain of more than average quality.

EXPERIMENTS WITH WINTER WHEAT.

For the second successive season all varieties of winter wheat sown on summer-fallow were spring-killed. As was pointed out in the report of this Station for the year ending March 31, 1912, winter wheat sown on summer-fallow suffers more from spring-killing than when sown on breaking—either new land or land ploughed out of cultivated grasses.

A small field of winter wheat was seeded on rotation "L." This land was ploughed out of timothy, alsike, and clover sod in July of 1912, and seeded to Kharkof winter wheat in August. This field yielded at the rate of 20 bushels 20 pounds of wheat and 36 pounds of timothy seed per acre, both of which were of good quality.

EXPERIMENTS WITH SPRING WHEAT.

Sixteen varieties of spring wheat were sown on April 10 on land which was summer-fallowed in 1912. Experiments conducted in previous years in which varying quantities of seed were sown per acre have indicated that heavy seeding for black clay loam soil will hasten maturity and increase yields. In sowing these varieties, therefore, seed was used at the rate of from 2¾ bushels to 3½ bushels per acre, depending on the size of the berry and the vitality test previously made. Seeding at the rate of from 2½ to 3 bushels per acre is recommended for heavy, black loam soil when the seed-bed is in good condition and the moisture supply at seed time plentiful, particularly in those districts where early maturity is an important factor. The season and location of plots this year conduced to the high standing of Red Fife, which is quite unusual for this variety at this Station, and this result should not be taken to indicate the general suitability of this variety for this district. Only the named varieties are mentioned in the following table.

SPRING WHEAT.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Red Fife	Apr. 10.	Sept. 13.	156	42	10	3·7	3,840	64	..	60
2	Bishop	" 10.	" 4.	147	39	9·5	3·5	3,240	54	..	59
3	Marquis	" 10.	Aug. 30.	142	36	10	3·2	2,820	47	10	63
4	Yellow Cross	" 10.	Sept. 4.	147	37·7	9·5	2·7	2,730	45	30	63
5	Early Russian	" 10.	" 6	149	36·7	7	3·5	2,520	42	40	61
6	Bobs	" 10.	" 2.	145	35·5	10	3·7	2,490	41	30	59
7	Huron	" 10	" 2.	145	37·5	10	3·5	2,360	39	20	62
8	Prelude	" 10	Aug. 20.	132	36·5	9·5	2·5	2,170	36	10	63
9	Pioneer (195 F.)	" 10.	Sept. 5.	148	37·5	10	3·	1,120	18	40	59

SPRING WHEAT.—Field Lots Suitable for Seed.

Variety.	Area.	Total Yield.		Yield per Acre.	
	Acres.	Bush.	Lb.	Bush.	Lb.
Marquis	11·101	517	30	44	57
Prelude	11·0	167	..	15	11
524B	·5305	11	23	21	31

EXPERIMENTS WITH RYE.

One plot of fall rye was sown on August 19, 1912, on summer-fallow, and on the same kind of soil, similarly prepared, one plot of spring rye was sown on April 19, 1913.

Variety.	Date Ripened.	Number of Days Maturing.	Length of Straw in inches.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	
					Inches.	Lb.	Bush.	Lb.
Fall rye	Aug. 20.	——	48	10	3·5	5,900	41	14
Spring rye	Sept. 5.	139	55	10	4	7,830	46	24

EXPERIMENTS WITH OATS.

Thirteen varieties of oats were sown April 18, on land which was summer-fallowed in 1912. Seed was used at about 3½ bushels per acre.

OATS.—Tests of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Daubeney	Apr. 18.	Aug. 26.	130	39·5	8	7·5	4,320	127 2	39
2	Regenerated Abundance	" 18	Sept. 4	139	47·2	10	7·5	3,550	104 14	41
3	Eighty Day	" 18.	Aug. 20.	124	36	8	7·7	3,070	90 10	37
4	Banner	" 18.	Sept. 5.	140	51·5	9·5	8·7	2,800	82 12	42
5	Danish Island	" 18.	" 3.	138	48	10	8	2,710	79 24	41
6	McDougal Scottish Prolific	" 18.	" 6.	141	48·5	10	8	2,650	77 32	44
7	Tartar King	" 18.	" 2.	137	41	10	10·2	2,550	75 —	40
8	Ligowo, Swedish	" 18.	" 2.	137	47·5	9·5	7·7	2,550	75 —	45
9	Gold Rain	" 18.	" 2.	137	48·5	9	6·5	2,520	74 4	45
10	Irish Victor	" 18.	" 4.	139	54·7	10	9·5	2,440	71 26	44
11	Victory	" 18.	" 8.	143	47	10	8·5	2,410	70 30	38
12	Siberian	" 18.	" 4.	139	51·2	10	9	2,250	66 6	42
13	Swedish Select	" 18.	" 2.	138	50·5	9	7·2	1,920	56 16	42

EXPERIMENTS WITH BARLEY.

Ten varieties of six-row and five varieties of two-row barley were tested in 1913, being seeded on April 19, on black clay loam soil, which had been summer-fallowed in 1912. Seed was sown at the rate of 2½ bushels per acre.

SIX-ROW BARLEY.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Marsfield	Apr. 19	Aug. 18	121	45	9·5	3·5	3,280	68 16	52
2	Stella	" 19	" 17	114	34·5	9·5	2·5	2,960	60 20	49
3	O. A. C. No. 21	" 19	" 17	120	44	9·5	2·7	2,800	58 16	50
4	Odessa	" 19	" 17	120	34	7·0	2·5	2,640	55 ..	50
5	Manchurian	" 19	" 19	122	45	10·0	3·0	2,610	54 18	49
6	Guymalaye	" 19	" 11	114	32	10·0	2·7	1,970	41 2	61
7	Success	" 19	" 7	110	34	10·0	2·0	1,290	26 42	48

TWO-ROW BARLEY.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Hannchen.	Apr. 19	Aug. 19	122	36	9·5	3·2	3,300	68 36	55
2	Swan's Neck. ...	" 19	" 18	121	37	9	2·7	3,220	67 4	52
3	Swedish Chevalier	" 19	" 20	123	35	7	3	3,070	63 46	53
4	Invincible	" 19	" 20	123	43 5	9·5	3	2,940	61 12	53
5	Early Chevalier..	" 19	" 11	114	44	9 5	3	2,420	50 20	53

BARLEY.—Field Lots Suitable for Seed.

Variety.	Area.	Yield.		Yield per Acre.	
	Acres.	Bush.	Lb.	Bush.	Lb.
Mensury	26·0	902	..	37	..
O.A.C. No. 21.....;	6·0	150	..	25	..
461 A.....	·171	3	25	20	28
465 B....	·2038	3	31	17	43
475 A..	·308	7	39	25	18
Success.....	·220	1	28	7	9

EXPERIMENTS WITH FIELD PEAS.

Six varieties of peas were sown on April 19 on summer-fallowed land, the seed being used at the rate of 2½ bushels per acre.

PEAS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after cleaning
					Inches.	Inches.	Lb.	Bush. Lb.	Lb.
1	Golden Vine..... ..	April 19	Sept. 2	136	50	2 5	1,840	30 40	64
2	Arthur.....	" 19	Aug. 26	129	41	2	1,680	28 ..	65
3	Chancellor..	" 19	" 29	132	49	2 2	1,620	27 ..	65
4	Prussian Blue.. ...	" 19	Sept. 5	139	52½	2·5	1,600	26 40	63
5	English Grey.....	" 19	Aug. 28	131	44	2 2	1,580	26 20	63
6	Paragon.....	" 19	Sept. 5	139	58	2·5	1,440	24 ..	63

DISTRIBUTION AND SALE OF SEED.

Five-pound samples of Kharkof winter wheat have been distributed to all applicants. The number of applications has been limited, and has come principally from the north and west. There has been a steady demand for Prelude wheat, which was sold in 2-bushel lots at $5 per bushel. The inquiry for seed barley has also been keen, and the supply has not been sufficient to meet the demand

LACOMBE.

SUB-STATIONS IN ALBERTA.

ST. BERNARD MISSION, GROUARD, ALTA.

REV. BRO. LAURENT, Experimentalist.

The fields of grain were sown during the first and second weeks in May. After seeding was finished there were violent winds until the 6th of June, making the conditions very unfavourable. From June 7, wet weather prevailed throughout most of the summer. The temperatures were rather low as a rule, especially at night. Only three hot days occurred, the highest temperature being 94° F.

In spite of the adverse weather, the grain grew well, but there was a good deal of lodging, especially in oats and barley.

Barley was ripe on August 10, but could not be cut until considerably later, on account of the wet condition of the ground.

On September 1, Early Red Fife wheat and Banner oats were ready to cut. Marquis and Preston wheats and Ligowo oats were cut ten days later, though they were not fully ripe by that time.

All the threshing was completed on October 9, with the following results: Early Red Fife wheat, 23 bushels per acre; Preston, 22 bushels; Marquis, 18 bushels. The Preston and Marquis suffered from being on heavy clay soil. Ligowo oats, 45 bushels per acre; Banner, 40 bushels. Odessa barley, 35 bushels per acre; Manchurian, 34 bushels.

Some of the varieties were grown in large fields. In no case was less than an acre sown.

GRAND PRAIRIE, ALBERTA.

S. J. WEBB, Experimentalist.

The spring of 1913 opened early, and seeding started on April 12. On the 20th there was a fall of snow which delayed seeding somewhat; but, taken all through, we had a very favourable spring, with plenty of moisture for germination. The season as a whole was very wet, so that haying and harvesting were difficult, and the quality of the crops was not what it would otherwise have been.

The following table gives the results of the variety tests of cereals:—

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel, after Cleaning.
				In.		In.	Lb.	Bush.	Lb.
Spring Wheat—									
Marquis	April 23	Aug. 25	124	54	6	3·5	2,400	40	60
Preston	" 23	" 28	126	50	16	3	2,100	35	
Oats—									
Banner	May 2	Aug. 6	96	50	10	9	2,380	70	40
Thousand Dollar	" 2	" 4	94	46	6	8	2,108	62	41
Peas—									
Arthur	May 2	Aug. 26	116	52	..	..	2,700	45	62

FORT VERMILION, ALBERTA.

ROBERT JONES, Experimentalist.

EXPERIMENTS WITH SPRING WHEAT.

Nine varieties of spring wheat were sown in uniform test plots of one-sixtieth of an acre each. Prelude, Marquis and Bishop were sown on land that was fallowed in 1912. The other six varieties were sown on land on which corn had been grown the previous year. Manure was applied for that crop. The land had been ploughed in the early part of June, 1912, and was kept well harrowed after every rain. The wheat was sown on April 21 to April 28, at the rate of 1¾ bushels per acre. The following were the yields obtained:—

SPRING WHEAT.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Weight of Straw.	Yield of Grain per Acre.		Weight per Measured Bushel, after Cleaning.
					In.	In.	In.	Lb.	Bush.	Lb.	Lb.
1	Bishop	April 21	Aug. 13	115	35	5	3·0	5,080	59	30	64·1
2	Marquis	" 21	" 11	113	37	5	3·5	4,680	49	..	64·5
3	Prelude	" 21	" 2	104	35	10	2·2	4,380	48	..	64·2
4	Stanley	" 25	" 9	107	38	10	3·5	4,320	45	30	62·0
5	Early Riga	" 28	" 6	101	34	10	2·7	4,440	43	..	59·5
6	Red Fife	" 21	" 15	117	36	1	3·0	4,080	42	..	62·8
7	Ladoga	" 25	" 4	102	36	1	3·0	3,960	42	..	60·8
8	Kubanka	" 28	" 25	119	36	1	3·0	3,360	41	30	64·4
9	Preston	" 25	" 8	106	36	1	3·0	4,020	39	30	62·3

EXPERIMENTS WITH OATS.

Five varieties of oats were sown in uniform test plots of one-sixtieth of an acre each on land on which roots had been grown the previous year and manure was applied for that crop at the rate of about 20 tons per acre. This was ploughed in the fall of 1912 and worked up in the spring, and sown April 30 to May 2, at the rate of 2½ bushels per acre. The yields are somewhat low on account of the very dry weather we experienced during almost all of the past summer. The following are the yields obtained:—

OATS.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Weight of Straw.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
					Inches.		Inches.	Lb.	Bush.	Lb.	Lb.
1	Banner	Apr. 30	Aug. 5	98	36	10	7·5	5,760	84	24	40·5
2	Ligowo	May 2	" 9	99	39	10	8·0	4,800	77	22	38·1
3	Tartar King	" 2	" 6	96	39	10	7·0	4,200	60	..	39·2
4	Black Mesdag	Apr. 30	July 24	86	34	10	7·0	3,600	45	30	35·3
5	Excelsior (black)	May 2	Aug. 16	107	34	5	8·0	3,120	42	12	39·8

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EXPERIMENTS WITH BARLEY.

Six varieties, two of two-row and four of six-row were sown in uniform test plots of one-sixtieth of an acre on land on which roots had been grown the previous year with the same treatment as for the oats. The barley was sown May 2 and 3 at the rate of 2 bushels per acre. The yield of Sidney and Canadian Thorpe are very low. These two plots were somewhat higher than the rest of the plots and, in consequence, did not yield as well as the others. The following are the yields obtained:—

BARLEY.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
	Two-row.				Inches.		Inches.	Lb.	Bush. Lb.	Lb.
1	Canadian Thorpe	May 2	Aug. 11	102	28	10	2·5	3,360	48 36	53·5
2	Sidney	" 2	" 8	99	30	10	2·7	3,300	30 20	53·0
	Six-row.									
1	Champion	May 3	July 31	90	35	1	3·5	4,680	65 ..	45·0
2	Mensury	" 3	Aug. 1	91	28	10	2·0	5,220	61 12	51·3
3	Success	" 3	July 26	85	36	5	2·5	4,320	60 ..	47·0
4	Claude	" 2	Aug. 4	95	30	10	3·0	4,400	60 ..	50·8

EXPERIMENT WITH FIELD PEAS.

One variety, Arthur, was tested on a one-thirtieth acre plot. It had been manured and a crop of potatoes had been grown on the land in 1912. After being well worked with a disc harrow and then with a smoothing harrow, the plot was sown on May 1 at the rate of two bushels per acre. The vines made a very strong growth in the early season, but wet weather in the early part of August prolonged the ripening period. The yield was very good. This variety ripened August 16 (108 days); average length of straw 42 inches; average length of pod, 2·7 inches; yield per acre, 42 bushels (2,520 pounds); weight per bushel, 65·4 pounds.

EXPERIMENTS AT FORT RESOLUTION, MACKENZIE DISTRICT.

Seeding began about the middle of May, under rather favourable conditions, the soil being moist. But as it is a muck soil and drought set in at once, some of the grain did not come up. The latter part of May and June were exceptionally cold. There was a sharp frost on June 25, and the grain suffered somewhat. Towards the end of July and the beginning of August there was abundant rainfall, but it came rather late to benefit the crops.

The following varieties of grain were sown with seed ripened at this station in 1912. Owing to the depredations of birds, all the grain was destroyed towards the beginning of September:—

Wheat.—Early Red Rife, Bishop, Yellow Cross.

Oats.—Pioneer, Gold Rain.

Spring Rye.

Towards the middle of June there were received from the Central Farm two samples of Eighty Day oats, two of Marquis wheat, two of Manchurian barley, but the season was so far advanced that it seemed best to reserve the seed for next year.

EXPERIMENTS AT FORT PROVIDENCE, MACKENZIE DISTRICT.

The season of 1913 was unfavourable in this district, owing to the drought which prevailed throughout the whole season. Rain fell only once, on June 10. On July 8 there was a sharp frost which injured the grain a good deal. Unfortunately the crows invaded the fields towards the beginning of August and left only one variety of barley, Manchurian. Chevalier, Hannchen, and Success were entirely destroyed, also Yellow Cross wheat. The other varieties of grain and especially the peas suffered from their ravages also. All the plots were sown with seed ripened here in 1912.

Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.
Wheat—			
Bishop	May 15.	Aug. 23.	100
Red Fife	" 15.	" 23.	100
Marquis	" 15.	" 23.	100
Preston	" 15.	" 23.	100
Barley—			
Manchurian	" 15.	" 19.	96
Oats—			
Banner	" 15.	" 19.	96
Gold Rain	" 15.	" 19.	96
Pioneer	" 15.	" 19.	96
Sixty Day	" 15.	" 19.	96
Thousand Dollar	" 15.	" 23.	100
Rye—			
Spring	" 15.	Sept. 4.	112
Peas—			
Arthur Selected	" 15.	" 4.	112
Golden Vine	" 15.	" 4.	112
Prussian Blue	" 15.	" 4.	112
White Marrowfat	" 15.	" 4.	112

EXPERIMENTAL FARM, AGASSIZ, B.C.

P. H MOORE, B.S.A., SUPERINTENDENT.

VARIETY TESTS OF GRAIN.

The plots for the variety tests of grain this season were on a piece of fall-ploughed grass land, this being the most uniform piece of land obtainable. Although special care was taken to have the land as uniform as possible, some of the results were very uneven and, consequently, were not as comparable as they would have been if the plots has been sown on manured and well-cultivated land.

Taking the season as a whole, it was wet and cool and not at all favourable for grain growing. In April there were 4·72 inches of rain; in May, 6·08 inches, which was very hard on the young grain; in June there were 7·33 inches, and in July (our harvesting month) there were 3·71 inches. In August, in the early part of which month the threshing was done, there were 2·71 inches, this being about the finest month of the season, and it allowed us to get the grain threshed in probably a little better shape than usual. All grain sown was treated with formalin as a prevention against smut, but, in spite of this, considerable smut appeared in the plots.

SPRING WHEAT.

Twelve varieties of wheat were sown, but this year they were attacked worse than ever by what appears to be "wheat midge" (*Diplosis tritici*). Mr. R. C. Treherne, of the Division of Entomology station here, made the following report from a thorough examination of the plots:—

INFESTATION OF WHEAT BY WHEAT MIDGE.

Variety.	Per cent infestation	Largest number of larvae per seed.
128 B	81 37	17.
Stanley	78 56	15.
Preston	76.85	15
Marquis	74.42	16.
Red Fife	71.43	16.
Huron Selected	70 45	14.
378 A	70 43	16.
Alpha Selected	68.88	9.
Bobs	64 15	13.
Bishop	61.54	13.
Early Red Fife	61.11	10.
Pringle's Champlain	46.66	10.

The results from the standpoint of yield, of these plots are worthless, and are not published. To a slight extent, this pest attacked the barley but not nearly to such an extent as the wheat.

OATS.

Some twelve varieties of oats were grown from head selected seed. This year, the shortest period in ripening was credited to the Eighty Day oats, which ripened in 104 days, and the longest season was taken by the Danish Island (119 days). The highest yielder from the plots we had this year was the Lincoln.

The following table will give the comparative yields, length and strength of straw, and the length of season.

OATS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.
					Inches.		Inches.	Lb.	Bush. Lb.
1	Lincoln	April 22	Aug. 17	117	49	9	8.5	2,400	70 20
2	Danish Island	"	" 19	119	48	9	8.5	2,320	68 8
3	Twentieth Century	"	" 15	115	43	8	8.7	2,160	63 18
4	Abundance "Regenerated"	"	" 16	116	46.5	9.5	9	2,000	58 28
5	Improved American	"	" 15	115	48	8	8.5	2,000	58 28
6	Eighty Day	"	" 4	104	39	8.5	5.5	1,960	57 22
7	Irish Victor	"	" 15	115	43	9	9	1,880	55 10
8	Thousand Dollar	"	" 17	117	44	8	8.2	1,800	52 32
9	Gold Rain	"	" 14	114	46.5	7.5	8	1,760	51 26
10	Ligowo	"	" 17	117	38	8	7.5	1,720	50 20
11	Swedish Select	"	" 16	116	42	8	8.5	1,600	47 2
12	Siberian	"	" 17	117	43.5	9	8.5	1,280	37 22

OATS FOR HAY.

Four varieties of oats were grown for hay. Swedish Select gave the largest yield, 2 tons per acre. Daubeney gave the lightest yield but a very fine straw, yielding 1 ton, 400 pounds per acre. Following are the results of the four varieties:—

Variety.	Date Sown.	Date Harvested.	Yield per Acre.		Remarks.
			tons.	lb.	
Swedish Select	April 24	July 25	2		Largest growth of leaves and a very coarse, strong straw.
Banner	"	"	1	1,600	Good growth of leaves. Coarse straw. Largest percentage of heads.
Ligowo	"	"	1	1,200	Short, leafy, uniform straw: stout and hard.
Daubeney	"	"	1	400	Fine straw. Low percentage of leaves. Rather hard in quality.

BARLEY.

From the fifteen varieties of barley which were grown this year, the Success (beardless) ripened in the shortest season, taking only one hundred days, but making the lightest yield.

The Danish Chevalier was one of the longest season varieties, taking 115 days, but making the highest yield. The yield of this grain is probably not as high as it would have been had it not been attacked by "wheat midge."

Tabulated results of this class of grain are given in the following table:—

BARLEY.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.
					nches.		Inches	Lb.	Bush. Lb.
1	Danish Chevalier	April 24	Aug. 17	115	37	7	3·5	1,800	37 24
2	Beaver	" 24	" 17	115	38	9	3·2	1,640	34 8
3	Hannchen	" 24	" 15	113	38	7	3·2	1,640	34 8
4	Canadian Thorpe	" 24	" 10	108	52	10	3·5	1,600	33 16
5	Swedish Chevalier	" 24	" 16	114	40	8	4	1,600	33 16
6	Mansfield	" 24	" 10	108	40	9	3	1,560	32 24
7	Clifford	" 24	" 6	104	50	9	3·2	1,520	31 32
8	Trooper	" 24	" 10	108	37·5	10	2·5	1,440	30 ..
9	Invincible	" 24	" 16	114	41	9	3·2	1,400	29 8
10	Odessa	" 24	" 6	104	32	7	2	1,360	28 16
11	Yale	" 24	" 13	111	36·5	10	3	1,320	27 24
12	Oderbruch	" 24	" 4	102	36·5	9	2·5	1,280	26 32
13	O. A. C. No. 21	" 24	" 9	107	39	9	2·2	1,280	26 32
14	Manchurian	" 24	" 14	112	39	9	3·2	1,240	25 40
15	Success	" 24	" 2	100	32	8	2·2	1,000	30 40

EXPERIMENTAL STATION, SIDNEY, B.C.

SAMUEL SPENCER, FOREMAN MANAGER.

As this Station has only been recently acquired it was not practicable to commence variety tests of cereals last spring. During the summer a suitable piece of land on the lower part of the Farm was prepared. Five varieties of winter wheat and three of winter rye were sown in October in plots of one-fifth acre each.

It is proposed to sow additional varieties of grain in the spring.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARM

REPORT

FROM THE

DIVISION OF BOTANY

FOR THE

Fiscal Year Ending March, 31, 1914

PREPARED BY

The Dominion Botanist. - - - - - - - - - - - - - - - - - H. T. Güssow.

REPORT OF THE DIVISION OF BOTANY.

(H. T. GÜSSOW, DOMINION BOTANIST.)

OTTAWA, March 31, 1914.

J. H. GRISDALE, Esq., B. Agr.,
Director, Experimental Farms,
Department of Agriculture, Ottawa.

SIR,—I have the honour to submit herewith my fifth annual report of the work carried on in the Division under my charge. Attached to this main report is a report from the Plant Pathological Branch Laboratory in St. Catharines in charge of Mr. W. A. McCubbin, M.A. The work of the Division, particularly that of advising farmers, fruit-growers, and others is increasing considerably, and much of the time of my staff is occupied by attention to these requests for information. However, some original investigations have been carried out, but it is realized that there are a considerable number of specific diseases and investigations along other botanical lines which will make an increase of the staff and laboratory accommodation most necessary in the near future.

Another feature of the work is the administration of the Destructive Insect and Pest Act, as far as plant diseases are concerned; owing to the prominence which the potato has received in this respect during the year my own time and that of several members of my staff has been occupied thereby to a great extent, and in consequence many important lines of research work had necessarily to be curtailed. For convenience sake the report is divided into the following sections, in which the more important work done by this Division is referred to in detail:—

I. Plant Pathology.
  (*a*) Destructive Insect and Pest Act.
  (*b*) Investigation of specific diseases.
II. Experimental work.
III. Economic Botany.
IV. Miscellaneous.
V. Report of St. Catharines Laboratory.

I. PLANT PATHOLOGY.

(*a*) ADMINISTRATION OF DESTRUCTIVE INSECT AND PEST ACT.

Diseases of plants may cause considerable economic losses by direct destruction of cultivated plants, but may also, if prevailing in one country or continent, result in the exclusion of a particular kind of vegetation from export into another country that may be found free from any such disease. Losses from diseases likely to be imported from other countries are guarded against by certain measures restricting importation or prohibiting it altogether from countries in which such diseases may prevail. This attitude is most correct, and different nations as well as parts of the British Empire are more generally adopting legislative measures for the control of

plant diseases. When, however, by reason of a disease a country is barred from further export of the vegetation concerned, this is another serious aspect of the "losses" caused by diseases of plants.

These measures should have a decided beneficial result inasmuch as they would compel or encourage a country under embargo to fight the disease in the most effective way in order to regain the market in the country that has placed such an embargo.

The Dominion of Canada felt it advisable to enforce such an embargo on potatoes grown in countries in which Potato Canker prevails. As soon as the countries affected by this measure are in a position to prove that they have successfully combatted Potato Canker, or are in a position to guarantee that no potatoes affected by such disease will be exported, this embargo will be removed, as it is not the intention of such protective measures to interfere with the commercial relations of two countries.

However, the Dominion of Canada during the time which is covered by this report experienced the effects of such embargo, which was placed upon Canadian potatoes by the United States for reason of a disease now well known to the farmer by the name of Powdery Scab. A public meeting was held in Washington on December 18, before the United States Federal Board of Horticulture to hear from interested parties why an embargo should not be laid. The Dominion Botanist was instructed to represent the department as technical expert. The United States authorities, however, decided to place an embargo until such times as would assure freedom from disease in imported potatoes.

The presence of Powdery Scab in Canada resulted in the loss of the American market, which was greatly lamented by growers in the eastern provinces. This disease has only been discovered in Canada in the fall of 1912; whether this disease has been long in this country or whether it is a serious disease does not concern us here, but owing to its presence in Canada farmers were not permitted to sell their potatoes in the States.

To eastern farmers, particularly those in New Brunswick, Quebec, Nova Scotia, and Prince Edward Island, this embargo is a very unwelcome measure, more so apparently than the disease itself. This is the wrong attitude to take, seeing that the disease causes as much damage to our own potato industry as it is thought it will do in the United States, but one fact is absolutely clear—the United States will be ready to admit the Canadian crop as soon as we have cleared our fields of this disease.

The Division caused detailed information on the appearance of this disease to be widely distributed, and every farmer who has seen a copy of the publication will find that the prevention and extermination of this disease—like any other disease—rests exclusively with himself. The directions are briefly these:—

First.—Use clean seed that is absolutely free from powdery scab, and preferably free from any kind of tuber disease.

Second.—Plant clean seed on land that has never borne a crop of potatoes before, or at any rate not a crop that has been diseased.

Third.—Avoid all contact with diseased potatoes, infected implements, bags, cellars, etc.

A crop grown from pure and sound seed, raised on land that is not infected, and that is found on inspection free from disease will gladly be accepted by the United States. It is hoped that all farmers in the Dominion will follow these instructions; the disease will then disappear and the market of the world be open again. When it is fully realized that these are the only means to check and eradicate the disease, and to re-establish the trade, it is hoped that the embargo will soon be lifted.

Detailed information about this disease is contained in Farmers' Circulars No. 4 and No. 5, which may be obtained by those who have not already received a copy by applying to the Publication Branch, Department of Agriculture, Ottawa.

OTTAWA.

This Division has endeavoured to carry out a widespread campaign with the object of securing the farmers' co-operation in eradicating this disease. Inspectors have been busy all over the provinces concerned, and a seed potato inspection has also been carried on as far as practicable. The future will show us whether the farmers have co-operated with us and can show a clean crop of potatoes this fall.

(*b*) Investigation of Specific Diseases.

Need for Specialization in the Investigation of Plant Diseases.

The investigation of diseases of plants includes the study of the cause and life-history of the causal organism, but is principally undertaken for the purpose of finding a cure or prevention of the disease. Investigations of this kind often require years to reach satisfactory conclusions. Some diseases have puzzled investigators for many years, and yet we are no nearer to the solution of some problems than we were when the disease was first taken up for study. Peach Yellows, Little Peach, Bitter Pit, Mosaic diseases, Leaf curls, etc., are examples of this type. Some of these diseases were known many years, the loss they cause even to-day is considerable, but nothing definite is known about their control.

There is most urgent need for more specialized study of the various diseases as they affect the different plants of economic value.

It was recently shown that the Dominion of Canada loses annually a sum of nearly $17,000,000 from smut diseases affecting wheat, oats, and barley. The grain rust causes probably a much greater loss. Obscure grain diseases are being reported from southern Alberta, hence it is most necessary to devote special attention to grain diseases. It is hoped that such work may be commenced at an early date, when it is intended to place a field laboratory in one of the western provinces in charge of an officer who will devote his time exclusively to the study of these diseases and the question of rust resistance.

VALUE OF FIELD STATIONS.

From the report of the officer in charge of the plant pathological laboratory in St. Catharines, which is a branch of this laboratory, it will be seen that considerable advance has been made in a comparatively short time, owing to the fact that this laboratory is situated in one of the most important fruit-growing centres of Ontario, affording a splendid opportunity for the study of fruit diseases. The officer is in close touch with the growers, is right on the spot to give advice and to demonstrate the methods of control and devote his time to the study of the diseases in the orchards, instead of endeavouring to experiment on vegetation not growing under the climatic or cultural conditions existing in the locality where the disease occurred.

It is felt that from the establishment of field stations in different parts of the Dominion, valuable results may be expected, and it is the intention of the Minister of Agriculture to afford every assistance for the extension of this work.

STUDENTS AND PLANT PATHOLOGY.

Students at agricultural colleges and the universities are advised to devote their special attention to plant pathological science, the future of which, it is reasonable to state, is most promising in the Dominion. At the present moment difficulties are experienced in securing the services of young Canadians who possess such special knowledge.

CONCERNING SENDING OF PLANT-DISEASE SPECIMENS.

During all parts of the year, but naturally more during the period of growth, the officers are kept busy answering the many inquiries and examining specimens of diseases

received from farmers or fruit-growers. Much time would be saved if more care were taken in packing the specimens so that they would arrive in better condition. The condition of some specimens is so bad that no result can be gained from an examination. Samples of diseased roots should be free from soil, which should be shaken but not washed off. Leaves and like specimens might be wrapped with rhubarb or cabbage leaves, when they will arrive in a fresh condition. It is of no use to send putrid matter —no advice can be given on specimens not in a fit condition for examination. The sending of good specimens showing the disease and its progress from the earliest stages to the more advanced is particularly requested. In the case of bacterial troubles, which spread very rapidly, this attention is most important.

DISEASES FURTHER STUDIED OR RECENTLY OBSERVED.

Potato Diseases.

Powdery Scab.—Reference has already been made to Powdery Scab, on the subject of which Circular No. 5, prepared by Mr. J. W. Eastham, has been published.

Common Scab.—A study of the organism of Common Scab has been commenced, which led to various new phases of research. The organism hitherto referred to as *Oospora scabies* Thaxter was originally, but provisionally, described by Prof. Roland Thaxter. After isolating the organism from tubers grown on the Central Farm, it was carefully studied, when it was found that it properly belongs to a group of bacteria known as sheath bacteria (*Chlamydobacteriaceae*), viz., *Actinomyces*. This genus commonly occurs in the soil and it will be found most important to carefully study these organisms with a view to the determination of their parasitism towards plants and animals. One species (*A. bovis*) causes the well-known "lump jaw" in cattle. We have also observed one species that occurred in milk. The disease "*Actinomycosis*" is known to have been found in the udder of cows, and the causal organism may then be found in milk of diseased cows. This germ also occurs in the air, water, on hay, and pasture herbage. Prof. F. Lafar in his "Handbuch" points out that frequently serious cases of disease have been observed, which apparently originated from the use of straws and grass haulms as "toothpicks"—by no means an uncommon peculiarity of persons walking through a field—which practice has resulted in the development of "*Actinomycosis*" a disease painful at any rate, if not fatal, which it may be once it reaches the lungs or respiratory organs. It is a fact which we have often observed that *Actinomyces* may be isolated from herbage, particularly of the order of grasses. The researches into the nature and relationship of these organisms now being conducted in this laboratory may reveal interesting facts.

Silver Scurf (See plate).—Of the potatoes sent in for examination from several provinces during the past winter quite a large number were affected with this disease. It is confined to the skin of the potato tuber and makes its appearance as ashy-grey spots on the surface. These become larger as time goes on, and several spots may become confluent, thus covering a large area of the tuber. The outer layers of the skin are killed by the fungus and take on a different colour from the healthy skin. Owing to the silvery sheen of the dead skin, and to the fact that it dries up and peels off readily, the disease has been given the appropriate name of "Silver Scurf." In many cases there is present, in addition, on the surface of these silvery spots, small black specks which are just visible to the naked eye. These are the "sclerotia" of the fungus, that is, each consists of a dense mass of closely interwoven fungus filaments, and by means of these the disease is reproduced.

If a tuber affected with Silver Scurf be washed and kept fairly moist for a few days the surface of the silvered spot appears as though a very thin layer of soot were dusted over it. This dark powder on examination under the microscope is seen to consist of the spores of the fungus. The fungal filaments running through the skin

of the silvered spot or those forming the sclerotium grow out from the surface of the tuber and bear the spores in groups along them, being more or less treelike in appearance. Each spore is of a dark-brown colour and consists of a row of cells. If placed in water during the summer months the spores germinate readily inside two days, and form a germ-tube several times the length of the spore itself. When tubers showing Silver Scurf are planted in the ground, doubtless spores are formed and germinate in a similar manner, and in this way the infection probably spreads to the next crop of potatoes.

The tree-like spore-bearing stage of this fungus was described by Harz as *Spondylocladium atrovirens*, while the sclerotium form was described by Frank as *Phellomyces sclerotiophorus*. Later, Appel and Laubert showed that they were both different stages of the same fungus, consequently the former name is the one by which the fungus is now known.

Orton, in Farmers' Bulletin No. 544 of the United States Department of Agriculture, published in 1913, states that the disease has recently been introduced from Europe and is spreading rapidly in the Eastern States. Melhus, in Circular No. 127, Bureau of Plant Industry, dated 1913, says that the fungus is not killed by seed disinfection with formalin or corrosive sublimate. On the other hand, Johnson, of Dublin, found that soaking the tubers for one hour in a solution of formalin of rather less than one per cent strength was an effective remedy.

Experiments showing the results of steeping affected tubers in various fungicides are being carried out at the Central Experimental Farm, but the results will not be available until the autumn of the year 1914. In the meantime, farmers would be wise to reject seed-tubers affected with this malady. Although the disease has not up to the present been regarded as a very serious one, still as it kills the outer cells of the skin of the tuber, and as these outer cells are the most important part of the skin in preventing the entrance of fungal diseases, it is just possible that it may prepare the way for other more serious maladies.

The accompanying plate shows the external appearance of the disease on the surface of the potato tuber.

"Black Heart" of Potatoes (See plate I).—Mr. E. T. Bartholomew, in Phytopathology *III*, p. 180 describes and figures a blackish discolouration in the centre of potatoes which is quite different from the "sprain" or "internal brown streak" or the "rusty spots" which are being observed from time to time. He publishes a preliminary note in which he states that this often purplish to inky-black spot, at times showing a central cavity, may be produced in potatoes that have been stored during winter by keeping them for a certain period of time in a temperature of about 40° C. (104½ F.).

We have had occasion to observe the identical trouble this spring. For experimental purposes, the following varieties were stored in a "pit" above ground at some rather exposed place at the Central Farm on November 1, 1913: Irish Cobbler, Gold Coin, Early Delaware, Carman No. 1. The outside temperature went down to some 30° F. below zero. The temperature of the pit was taken daily by a self-registering thermometer. During no time was the temperature recorded below 32·5° or above 46·5° F. Thermometer and recorder were both reliable.

The same varieties of potatoes were stored in the farm root-house where at no time did the temperature rise above 45° F. or go down to freezing.

A third lot was stored in the cellar of a heated barn where the temperature went little above 42°F.

Good ventilation existed in all three places of storage.

In April, 1914, the pit was opened and showed that frost had no doubt invaded the pit, the upper layer of potatoes showed plain signs of the wet and pulpy spots due

to frost. It must be remembered that the thermometer went to about the centre of the pit in a wooden tube.

When it was noticed that frost had to some extent touched the stored potatoes, a number of tubers were cut while they were being removed, when it was found that Delaware showed 20 per cent, Irish Cobbler 10 per cent, Gold Coin 30 per cent, and Carman No. 1 20 per cent of the tubers with the characteristic radiating central discoloration. In some instances we observed a certain pinkish coloration in the centre of a good many potatoes, but they did not show the typical black heart. On exposure to air these portions turned reddish and then blackish, but were not very clearly defined in outline owing to the turning dark of the cut surface which always occurs on exposure to air. After they were taken from the pit these tubers were stored about two weeks in the root-house where the others had been stored over winter. Another examination was then made. From each of the four varieties about twenty-five tubers were taken, without any selection; on cutting them in halves 90 per cent of them showed the typical black heart. We then examined a similar quantity of the same varieties which had been stored since harvest in the root-house. In no single instance did any such discoloration appear when cutting the tubers of the same varieties grown on the same field and harvested under the same conditions. The only difference of treatment was in the storing, those wintered in the pit showing 90 per cent black heart, and those in the root-house with none at all affected. In this connection it is interesting to note that according to Bartholomew a comparatively high temperature of 104° F. will result in what is apparently the same thing as occurred with us, and which we feel disposed to regard as frost injury.

The appearance presented by these potatoes taken from the pit is shown in the accompanying plate.

Potato diseases transmitted by the use of unsound seed potatoes.—Attention is called here to the publication of a folder showing the principal potato diseases resulting from the use of unsound potatoes for seed. This folder shows the various diseases in natural colours, which should enable every farmer to determine at once which diseases to avoid when preparing for planting. The drawings have been executed under the Dominion Botanist's direction by Mr. A. E. Kellett, an officer of the Division of Entomology, who deserves much credit for the artistic skill with which he has prepared them. This publication was printed in an edition of 125,000 copies in English and 40,000 copies in French, and was very widely distributed. Farmers are most earnestly requested to follow the instructions in this special circular, when it is reasonable to hope that potato diseases will soon decrease in virulence. It cannot be said too often that the potato grower is the only person who is in a position to produce a crop which is free from disease. And, naturally, disease-free potatoes will find a much more ready sale than diseased ones which are a menace to the whole country.

DISEASES OF FRUIT TREES.

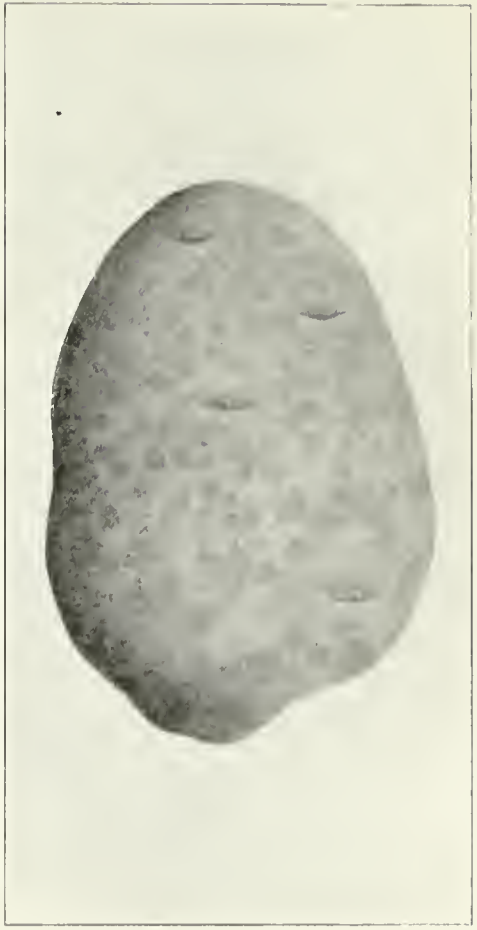
Apple Canker.—(The following notes on Apple Canker were supplied by Mr. J. W. Eastham, B. Sc.):

"About the middle of July, I made an inspection of a number of orchards in the vicinity of Fredericton, N.B., with a view to ascertaining if any injury were being done to apple trees in this vicinity by the *Nectria ditissima* canker. Although a number of very neglected orchards were visited, many of the trees in which were dying back and in which spraying was never practised, no *Nectria ditissima* was found.

"I then proceeded to the Annapolis valley, commencing at the Digby end. Around Digby a few cankers were noticed, but I did not find any orchards here of any size. Around Bridgetown and Annapolis Royal there were a large number of neglected orchards, and in these cankers were found in abundance. In some cases in young

16—1915 p. 886.

Injury due to frost penetrating potato pit.



"Silver Scurf," a disease causing a silvery sheen on surface of potatoes.

orchards it seemed likely that a goodly number of trees would be girdled and killed, but in most cases it seemed as though a branch might continue to fruit for many years after being invaded, cankers being found with successive annual growths of ten years or more. In these neighbourhoods also, where orchards were well cared for, especially in the matter of spraying, the disease did not appear to be destructive. Perithecia were found in considerable quantity.

"Around Kentville, Wolfville, Starr's Point, and other points in the upper Annapolis valley the orcharding is of a much better type and while cankers could be found, the amount of injury being done by them did not seem to be very great. In this region also the most susceptible variety, the Nonpareil, is grown to a less extent. Altogether it seems clear that the disease is only a menace where proper pruning and spraying are neglected.

"On the return journey a visit was paid to Dalhousie on Chaleur bay. This is apparently a very exposed point and the few apple trees noticed were very poor, stunted, and apparently much injured by climatic conditions. Here one case of *Neetria ditissima* on an apple tree was found."

Silver Leaf of Fruit Trees.—Investigations of this obscure trouble carried on since 1909, while successful so far as to prove that the peculiar silvering of the leaves may in many cases be attributed to an infection with the fungus *Stereum purpureum Pers.* for which we have conclusive evidence, leave no doubt in our minds that this curious phenomenon may result from other agents too.

The fungus *Stereum* causes the leaves to assume the silvery colour, apparently by the action of some ferment produced by the fungus, and the effect is prominently visible in the leaves; it is in this case not due to a local infection but rather an action at a distance.

We have been able to make some observations in an orchard at Salmon Arm, B.C., which proved the silvering of the leaves may also be due to a local agent, *i.e.*, acting directly upon the cells of the leaves and producing the silvery colour.

In the fall of 1912 we observed a pear tree in the locality referred to, the leaves of which showed typical silvering; the tree was marked for observation and was visited again a year later after a request by the owner, who claimed he had succeeded in controlling the disease by a simple application of Black Leaf 40, a nicotine preparation now in common use against various insects. That the claims of the owner were correct was revealed by a more careful examination. The leaves covered by the spray were nominally green, but those above the reach of the spray still showed signs of silvering. This phenomenon was now carefully examined, when it was found that the appearance of these silvered leaves differed somewhat from the *Stereum* silver leaf inasmuch as the leaf was covered with clearly defined patches of silvery area, which in some instances had become confluent, involving the whole upper surface of the leaves. This is never the case in *Stereum* silver leaf. Examination of the surface with a 20-diam. magnifying lens then revealed the presence of minute mites, apparently of the genus *Eriophyes*. No determination was made at that time of the mite, but immediately a thorough inspection of the leaves of other trees affected with silver leaf was made, with the striking result that a mite of the same kind, or closely related at any rate, was discovered. This observation no doubt accounts to some extent for the "recovery" of trees from "silver leaf" which we have not observed in the "*Stereum*" silver leaf.

In order to show the close resemblance and difficulty of distinguishing these two types of silver leaf, we forwarded specimens of true silver leaf and mite silver leaf to Mr. Brooks, of Cambridge, England, who is very familiar with this disease. On receipt of his report we found he was able to confirm our first diagnosis merely stating that the specimens should be regarded as affected by silver leaf disease. On specially pointing out the differences this observer immediately was in a position to distinguish between them.

From this preliminary statement it will be seen that two very different causes may at times result in producing very similar symptoms.

OTTAWA.

Where silver leaf exists it would be advisable to first try a spray of Black Leaf 40 or lime-sulphur just before the leaf buds open. If the disease persists it is evident that it is not caused by mites.

Dr. Waite, in charge of the fruit disease investigations at Washington, informs me in a letter that the mite observed may be identical with that described in Bulletin 283, Geneva, N.Y., Agricultural Experiment Station as *Phyllocoptes schlechtendali*.

Meanwhile the investigations into the nature of this disease are being continued.

HOUSE-FLY FUNGUS.

A fungus destructive to house-flies.—Since it has become recognized that the common house fly is a potential source of danger to the public health as a carrier of pathogenic micro-organisms, the question of an effectual and practical method of exterminating, or at least reducing the prevalence of this insect during the summer months, has attracted considerable attention.

As a means towards the solution of this problem, the study of certain organisms of fungal or bacterial nature liable to cause an epidemic among flies seems most important. As time permits, such investigations have been conducted by the Dominion Botanist. Among the commonest of fungus diseases of flies is the *Empusa Muscae* Cohn, which kills off a considerable number of flies each year. Flies killed by this fungus are conspicuous by the life-like position they retain when killed and the white spore-dust surrounding the dead bodies for a short distance. At the present time, while we have succeeded in infecting flies very readily with the fungus spores and thus causing death among them, our experiments came to an end prematurely when we failed in January to secure more flies for infection. This experience was reported for several seasons, but the end in view warrants further researches in this subject.

The value of organisms causing epidemics among noxious insects is best demonstrated by the grasshopper bacterium *Coccobacillus acridiorum*, successfully isolated and tested by Dr. d'Herelle of the Pasteur Institute of Paris.

II.—EXPERIMENTAL WORK.

As indicated in our last report, the experiments on growing potatoes on 4 acres of land "free from disease, or as free from disease as possible," have been continued during the last season. The potatoes produced were a very good crop and of splendid keeping quality. Five varieties have been grown which gave a total yield of 866 bush. and 34 lbs.

The cultural work in the field has been carried on by Mr. D. D. Gray, Farm Foreman, while this Division had charge of the treatment of the seed tubers and the spraying operations throughout the season.

POTATO-PITTING EXPERIMENTS.

Owing to the often considerable losses from storing potatoes in unsuitable root-houses or cellars, as referred to in our last year's report, we have tried the experiment of storing the tubers in a pit on the level ground. The wintering of potatoes in pits may prevent the losses from decay and prove a cheaper means than the building of cellars or houses for the purpose. Fifty bushels of four varieties were wintered in a pit constructed in the following manner:—

Two boards, each perforated by a number of 1-inch holes, of the length of the intended pit, were nailed together at an angle so as to enclose a space between them. They were then placed on the ground, the air-space between them serving for the purpose of ventilation. The boards and ground over the area to be occupied by the pit were then covered with a layer of straw 1 foot deep. The potatoes were piled thereon, forming an angular ridge. They were then covered with another layer of straw about 6 inches thick, a beam of about 8 inches in thickness was laid on the top of the ridge and the whole covered with another layer of straw and about a foot of soil then placed all round. After the whole heap had been allowed to settle properly the beam was carefully pulled out from the end and another ventilation tube resulted. Both ends of this tube were plugged with a bunch of straw to be opened or closed as the temperature of the pit required. The temperature of the pit was taken daily by means of a self-registering thermometer which could be let down on a string through a small wooden tube to about the centre of the pit. There was no heating of the pit nor any frost recorded by the thermometer. The temperature outside the pit dropped some 30° F. below zero, and a good many potatoes on the outside of the pit were found to have been touched by frost, but none were found to show anything like the storage rots which were present in the cellar and root-house. The experiment seems worth repeating. This form of pit may prove of value in a good many districts of Canada where the temperature does not go so much below zero, and it has the advantage of being of a very simple construction.

III.—ECONOMIC BOTANY.

GENERAL CONSIDERATIONS ON WEEDS.

In order to be in a position to deal with the question of weeds in a proper and scientific manner it is obvious that the more one knows about the weed and its manner of growth the better fitted will one be to combat it. In some of the older countries of the world a good beginning has been made, such as, for example, the work of Fruwirth in Germany. But this is a problem that each country must work out for itself as the mode of life of any particular weed is by no means the same in all countries. It frequently happens that when a species of weed is introduced from one country to another it spreads more rapidly and is much more troublesome than it was in the parent country. It is evident, too, that in a country like Canada, where there is great diversity of climatic conditions, any investigations which are to be of value would require to be carried out in several provinces of the Dominion. As indicating lines along which investigations might profitably be conducted, the following are some of the more important headings on which complete information seems desirable:—

(1) Whether the particular species of weed is a native of Canada or has been introduced from some other country. If introduced, the manner of its introduction should be known as far as possible and whether it is still being introduced among farm or garden seeds at the present time.

(2) Its geographical distribution in the provinces of Canada.

(3) Its relation to soils of various kinds. It is well known that some weeds have a decided preference for a limy soil, others prefer a soil in which lime is almost entirely absent, while there are others which will grow equally well on either.

(4) Its relation to the various crops grown on the farm. Some weeds thrive best on tilled land while they disappear or at least are held in check if a hay crop be

grown. Some, such as Orange Hawkweed, grow rapidly on cultivated land and are equally at home on stony pastures. It is evident in a case such as this that the same method of eradication cannot be prescribed alike for the two cases.

(5) Its natural method of spreading, whether by seeds, surface runners, underground stems, etc.

(6) If spread by seeds or fruits, the manner of its dispersal should be known, whether the fruits are carried by wind, as in the thistles, or by animals, as in the case of blue bur, or have no special mechanism for dispersal.

(7) Time of flowering and time of ripening of the seeds. In some cases the latter will coincide with the ripening of the crop among which it is growing while in others it may be earlier or later.

(8) Time of germination of the seeds when self-sown in the ground.

(9) Vitality of the seeds when buried in the soil. Opinions seem to differ as to how long the seeds of weeds can remain alive in the soil, and further investigations will be necessary before the point can be accurately determined. Seeds, if kept dry, appear to lose their vitality much quicker than buried seeds. There is no doubt that many of the latter can germinate after being buried for twenty years.

(10) Relation to moisture. The problem of destroying weeds is rendered more difficult in a region with light rainfall, such as Alberta. Here the usual method of ploughing the weeds under after they have germinated is scarcely applicable at certain seasons of the year, as the supply of moisture is not sufficient to induce the seeds to germinate. Some weeds grow best where the soil is fairly damp; drainage retards them and enables other plants to crowd them out.

(11) Relation to temperature. As regards the exact temperature at which weeds or weed seeds are killed by frost, we have little, if any, reliable information.

(12) The susceptibility of weeds to chemical sprays. A number of experiments have been made showing the action of various sprays such as copper sulphate, iron sulphate, etc., on various plants, but the series of experiments ought to be extended, and other chemical substances tried at various stages in the plant's history. It is just possible that a spray which would have no effect on the foliage might injure the flowers sufficiently to prevent the formation of seeds.

A knowledge of the life-history of a weed in the widest sense as outlined under the headings above would render the weed problem more easy of solution, especially if aided by effective legislation.

POISONOUS PLANTS.

We are glad to note that the number of cases of poisoning due to plants reported to us has not increased; but we still receive numerous requests for literature on poisonous and medical plants, with specimens for identification. The plants which we have had most inquiries about, are given below. They are arranged in the following manner in the hope that although some of them are well known by their common name and appearance, the additional knowledge of their poisonous nature may avert danger.

POISONOUS.

Actæa rubra (Red baneberry).
Actæa alba (White baneberry).
Anemone patens var. *Wolfgangiana* (Prairie anemone).
Cicuta vagans (Water hemlock).
Daphne Mezereum (Daphne).
Equisetum arvense (Horsetail).
Iris versicolor (Blue flag).
Lobelia inflata (Indian tobacco).
Oxytropis Lamberti (Loco weed).
Rhus Toxicodendron (Poison ivy).
Sium cicutaefolium (Water parsnip).
Solanum Dulcamara (Bittersweet, nightshade).
" *nigrum* (Black nightshade).
Taxus canadensis (American yew).
Trillium erectum (Red trillium).
Trillium grandiflorum (Large-flowered trillium).
Trillium undulatum (Painted trillium).
Zygadenus undulatum (Death camas).

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MEDICINAL.

Acorus calamus (Sweet flag).
Aralia nudicaulis (Wild sarsaparilla).
Apocynum androsaemifolium (spreading dogbane).
Coptis trifolia (Goldthread).
Hamamelis virginiana (Witch hazel).
Hydrastis Canadensis (Golden seal).
Panax quinquefolium (Ginseng).
Polygala Senega (Seneca snakeroot).
Solanum Dulcamara (Bittersweet, nightshade).
Trillium erectum (Red trillium).
Trillium grandiflorum (Large flowered trillium).
Trillium undulatum (Painted trillium).

SUSPICIOUS.

Apocynum androsaemifolium (Spreading dogbane).
Nepeta hederacea (Ground ivy).
Menispermum canadense (Can. moonseed).
Pastinaca sativa (Wild parsnip).
Solanum triflorum (3-flowered nightshade).
Thermopsis rhombifolia (Prairie thermopsis or false lupin).

This list by no means comprises the poisonous and medicinal plants of Canada but only those about which we have given information this year.

BOTANIC GARDENS.

The past year on the whole was favourable, although during the continued dry weather many of our experimental plants perished, owing to the lack of watering facilities in the gardens.

Great success has been obtained in growing the English primrose (*Primula vulgaris*) out-of-doors in Canada. A spot was chosen for it under the trees in the arboretum where it enjoyed as nearly as possible the conditions of its natural environment.

The seeds for exchange purposes this year included 519 different species gathered from plants in the Botanic Gardens. Upon request, over 800 packets of these seeds were sent to foreign Botanic Gardens and to persons interested in Canadian plants.

The labelling of the plants in the half mile of perennial border with the nomenclature of Engler and Prantl is being continued.

HERBARIUM.

Many specimens new to the herbarium have been added during the year. These were collected by the staff, in British Columbia, and at Quebec, l'Islet and Rivière-du-Loup.

Our thanks are due to Mr. W. H. Brittain for the presentation of fifty different species collected at Vernon, B.C.

GERMINATION TESTS OF WILD RICE.

Sowings of wild rice seed had been made at the Farm in the autumn of 1911. In the spring of 1912 it was found that the seeds which had been left dry in the laboratory for a few days before sowing, germinated quite as freely as those which had been sown immediately after gathering from the plants. This fact gave rise to the question, was it possible to keep fresh wild rice seed in a dry condition without impairing its germinating power long enough for transportation across country? This question is of very great importance in establishing wild rice, as for many reasons the autumnal sowing is preferable to spring sowing of seeds specially stored during the winter. To answer this question germination tests were made, during 1912 and 1913, of seeds which had been kept dry from one to twenty-one days.

The result of these tests proves that wild rice seed kept in a dry condition for one week after date of gathering will give from 72 to 96 per cent of germination; for two weeks, 60 to 74 per cent. The three-week test gave 76 per cent in one case and for some unaccountable reason only 2 per cent in the other.

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A packet of dry seeds was sent to the Royal Botanic Gardens, Kew, London, England. The seeds which had been kept dry for twenty-five days germinated 42 per cent, which result was 20 per cent better than the test of the seeds sent wet.

In all cases the seeds from western Ontario gave the best results. They are much larger seeds than those gathered near Ottawa. But it is important to point out that the latter seeds were at a great disadvantage from the beginning, as after being gathered they were spread out in the hot sun and left there unprotected for a whole day. This is not at all necessary if ordinary precautions are taken. The seeds should not be gathered just after a rain when the whole plant is naturally wet, nor should they be put into a wet boat. Only the mature seeds drop off readily from the stalk so that in gathering there is very little chance of getting young and "milky" seeds. If, however, there is any danger of fermentation, the seeds may be spread out for a few hours in a dry atmosphere but protected from the sun. They should be turned over two or three times to let the air thoroughly through them. On no account should they ever be exposed to intense heat.

QUEBEC WILD RICE.

The seeds of the Quebec wild rice are only half the size of those from western Ontario. The plants are also very much smaller. As is well known, there are two species of wild rice growing in Canada, i.e., *Zizania palustris* and *Z. aquatica*. We are not yet in a position to state whether the Quebec wild rice is *Z. aquatica* growing under adverse circumstances due to tidal conditions, or whether it is a variety of the same. It was found growing in abundance both on the north and south shores of the St. Lawrence river. At Beauport, there is a large stretch of low land on the Beauport flats which the inhabitants call "La Canarderie" where the wild rice is most abundant, and where the wild ducks flock to eat it. Wild rice was also found at Cap Rouge, Montmorency, and Ste. Anne station. On the south shore, it was growing at St. Joseph de Lévis, just below the graving dock, at Lévis above the Grand Trunk station, at Hadlow, and along the shore up to New Liverpool. No doubt it also grows on both sides of the St. Lawrence for a considerable distance below Quebec, as it was found in abundance at L'Islet, 50 miles from Quebec. There was, however, no sign of it at Rivière-du-Loup, owing to the salinity of the water.

IV.—MISCELLANEOUS.

INTERNATIONAL PHYTOPATHOLOGICAL CONFERENCE.

The Dominion Botanist was appointed by an Order in Council to represent the Dominion of Canada at the above conference held in Rome from February 24 to March 4, 1914. The conference, which was held at and under the auspices of the International Institute of Agriculture for the purpose of securing international co-operation in the control of plant diseases, was summoned by the Government of France in conjunction with the Italian Goverment. His Majesty the King of Italy, in person opened the conference. Thirty-one countries were represented by sixty-three delegates.

A series of meetings was held at which the delegates expressed the general desire of their respective Governments to abide by previous decisions of the General Assemblies of the International Institute of Agriculture, and to continue the measures already agreed upon at previous agricultural congresses. The conference, without in any way interfering with the measures adopted under existing international agreements, drew up a draft convention, dated March the 4th, 1914, to be submitted

to the various Governments for approbation, and signed by the plenipotentiaries nominated for the purpose if approved.

The convention comprised twenty articles in which are specified the special requirements for an organization of an adequate official phytopathological service. This official service will include as a minimum: (1) the creation of one or more research stations for scientific and technical investigations, (2) the organization of an efficient supervision of cultivation, (3) the inspection of consignments, and (4) the issue of phytopathological certificates.

In connection with the attendance at the conference in Europe, the Dominion Botanist was authorized to visit some of the principal agricultural plant pathological and milk bacteriological institutions of the continent of Europe.

EVAPORATED POTATOES AND THEIR ECONOMIC VALUE TO AGRICULTURE.

One of the various subjects inquired into on the occasion of the visit to Europe was in connection with the process of drying potatoes, which is largely practised in Germany.

The necessity of using potatoes in a dried condition—quite apart from their recognized value for human consumption, stock food, or for technical purposes—will and must largely depend upon the total production of potatoes in the country if such practices are to be carried on with profit. As soon as there exists an over-production, potato drying might well be made the subject of closer study. In Germany the production of evaporated potatoes has increased to a very great extent in the last few years. This is due: First, to the over-production of potatoes; second, to cheaper labour and freight charges; and third, to the perfecting of machines carrying out the process. In Canada, none of these salient features exists, and it will be necessary before pronouncing an opinion in favour of or against this process to take the conditions existing in the Dominion into careful account. The most important question is, naturally, "Is the value of desiccated potatoes so great as to warrant establishing this industry in Canada?" The real commercial value of them as an article of food for man and animals will depend largely upon the cost of production, and that is where a country like Germany has a great many advantages. To begin with the price of potatoes is considerably higher here, and it is a subject of experiment if a profit will be gained from the finished article. It must be remembered here that, generally speaking, 3½ bushels of raw potatoes will produce about 1 bushel of dried potatoes, but this will vary according to the starch contents of the potatoes used.

The cost of production in Germany per bushel of dried potatoes is about 2½ cents. The price of raw potatoes in Germany varies from 20 cents to 25 cents per bushel, and in the form of dried flakes the price per bushel is from 80 cents to one dollar. On the face of it, it would seem that at the present time this industry will hardly prove of value to Canada. At any rate, careful experiments will have to be carried on first to try this process here. The advantages of potato evaporation may be summarized as follows:—

(1) Evaporation of potatoes would consume all potatoes for which there is no other market, and which would otherwise go to waste.

(2) Through the process of drying, a considerable amount in cost of transportation will be saved.

(3) The nutritive value of evaporated potatoes will not be influenced by heat or frost, and they will keep indefinitely, if at all reasonably stored.

(4) They occupy less space and will be a very useful stock food in years when other food is scarce.

(5) Potato evaporation would be one means to solve the problem of utilizing potatoes affected with diseases, which are now being sold and tend to spread diseases over a wider area.

Inquiries into this subject will be pursued before further comments are made.

OTTAWA.

THE SIGNIFICANCE AND PROBLEMS OF AGRICULTURAL BACTERIOLOGY.

In connection with the European visit of the Dominion Botanist, several bacteriological institutions were visited, and from the specialized attention which is being paid in other countries to this fundamental basis of agricultural economy, a few remarks on the significance and the problems of this branch of agriculture will not be found out of place in the present report.

The practical significance of agricultural bacteriology consists in educating the farmers to avail themselves to the utmost extent of the aid of bacteria and fungi with which they come into daily contact, without at present realizing to any extent their important rôle in the household of nature. Many of the technical measures in agricultural practice are aimed to directly or indirectly influence the life and activity of the useful or injurious micro-organisms. Much success has already been achieved by the use of the pure cultures of certain leguminous bacteria for the improvement in the field of such crops. On the other hand, bacteria may show themselves of as great value, as at times they may be injurious, in the conservation of various feed materials, the production of clean milk, the manufacture of butter and cheese, the decomposition and use of stable manure, and last but not least, the action of fungi, bacteria, and protozoa in the soil may exert a decidedly beneficial or a very injurious influence, as the circumstances may be. In consequence of a more or less pronounced indifference towards this important branch of agricultural science, many countries in the world in which extensive farming in all its branches is being carried on still suffer enormous economic losses by not utilizing the helpful assets in the form of agricultural by-products to the fullest extent. One example may suffice here which will clearly indicate the great gain by the correct use of stable manure. It has been demonstrated that this valuable asset to agriculture is more generally utilized to only 3 per cent of its value, while a study of the action of organisms in manure has shown that at times it may be used to more than 40 per cent of its value. Depending upon the length of time it has been lying in a heap, the value of stable manure is often considerably reduced by the action of bacteria. Another feature of bacteriological nature is the incomplete utilization of green manure; surprising seems the influence of such matter upon the micro-flora of the soil, providing it is used at the proper time. On the whole the usefulness of bacteria in relation to agricultural practices is very pronounced; serious losses through wasteful practices due to imperfect knowledge of the usefulness of such organisms will be averted by a close study and practical application of the principles of agricultural bacteriology.

Some of the more important and immediate problems in this connection may be cited:—

(1) Investigation into the changes during storage of the various kinds of animal manures. (Losses of nitrogen, availability to crops of nitrogen, utilization of other plant nutriments, influence of various methods of conservation.)

(2) Maintenance of soil fertility, through timely supply of humus, culture of crops increasing the fertility of the soil, suitable rotation and rational methods of cultivation. (Experiments in humification processes, green manuring, influence of crops on the micro-flora of the soil, summer and winter fallowing, etc.)

(3) The study of changes in the milk, butter, and cheese. (Efficient mode of treatment of dairy utensils, milking machines, etc., butter and cheesemaking from pasteurized milk by the use of pure cultures.)

(4) Conservation of potatoes, roots, etc., through pure cultures, particularly the ensilage of nitrogenous plants (clovers, etc.).

A closer attention to the study of the micro-organisms that may be employed to advantage in agriculture would soon reveal their enormously useful activity, while it would also result in demonstrating the losses due to the injurious groups, which by skilful practice and by aid of advice such as can only be obtained from close researches, will soon not only become averted but turned into a profit.

OTTAWA.

V.—REPORT OF ST. CATHARINE'S FIELD LABORATORY FOR 1913.

The work of this laboratory has been carried on under much better conditions than in 1912, owing to improved laboratory accommodation and to the additional equipment which was installed during the year. According to the plan which has been followed since the Station has been in existence, the work has proceeded along three lines. Of these, research work in plant diseases is considered of primary importance and has received the most attention. A second branch of the work has in view a general oversight of the Niagara peninsula, so as to obtain as accurate a knowledge as possible of the prevalence and spread of diseases now present, and of the introduction of new diseases. The third phase concerns the identification of plant diseases and the giving of advice regarding their control. Since during recent years there has been a considerable influx into the fruit-growing industry of men from other occupations many of whom have had little or no experience, this advisory work has been and will continue to be of special benefit to these new-comers.

During the year, the collection of disease specimens has been considerably augmented, and numerous photographs of these have been taken from time to time. From these photographs seventy-five lantern slides have been prepared for use in illustrating addresses.

An exhibit of about thirty diseases of local occurrence was prepared for the St. Catharines Fruit and Flower Show and because of the interest manifested in it, it is proposed to make a similar exhibit next year, but on a larger scale. All the meetings of the local Fruit Growers' Associations were attended as far as possible, and short addresses given on topics relating to diseases. The results of the experimental work carried on will be published in the form of a bulletin. A bulletin on fruit diseases and their control as far as they have been investigated in the district up to the present has been prepared, and will be published shortly.

General Conditions in 1913.

The spring of 1913 began early and a good deal of spraying was begun by March 20. A succession of late frosts occurred during the blossoming season, however, and some damage was done to the cherry crop, but the fertilization of the peaches had already taken place, and the young fruit was sufficiently advanced to be unhurt by these frosts. Among the shade trees which were putting forth foliage at this time, there was a good deal of frost injury to the leaves. During July and August the weather was very hot and dry and the strawberry and raspberry crops suffered considerably from drought during the end of their season. This period of dry weather was relieved by rains which came in ample time to ensure the growth of tree fruits. The fall and early winter were characterized by exceptionally warm weather and there was no frost in the ground until January 15, 1914. Thereafter a sudden lowering of temperature took place, and a cold period, in conjunction with a similar but more extended one in February, destroyed a very large proportion of the fruit buds of the peach, besides giving rise to numerous cases of winter injury of other sorts.

Important Diseases in 1913.

APPLE.

Scab (*Venturia inæqualis* Aderh.) is the worst fungous disease met with on this fruit. During the early part of the season conditions were not very favourable for its development, and where trees were well cared for and properly sprayed, the fruit was clean. Later on in the season, however, a few orchards developed scab in the

warm moist weather following the midsummer drought and the occurrence of this late infection in orchards that had been well sprayed raises the question as to whether an additional summer spraying will not be necessary in seasons like the recent one. According to the best orchard practice at present, three sprayings are given with commercial or home-boiled lime-sulphur, the first being applied just before the blossoms burst, and should test with the hydrometer 1·030 specific gravity; the second (testing 1·009) is applied just before the blossoms open; the third (testing 1·008) is put on just after the blossoms fall, but while the calyces still remain open. The fourth application which may be necessary in damp summers should be given as soon as indications of the scab appear on leaves, where it usually first shows itself.

Black Rot (*Sphæropsis malorum* Pk.).—This fungus is responsible for the greater part of our apple rot, especially on fallen fruit. In our climate it is most seriously prevalent in the fruit on the tree, but it attacks windfalls and apples in storage. It is far less prevalent in well pruned and sprayed orchards, and a great deal can be done to lessen the infection of the fruit by keeping the trees free from fungus. Infection takes place from spores derived from old rotten fruit and also from spores formed in cankers, sun scald areas, and dead twigs. If care is taken in pruning to remove these sources of infection as far as possible, and to destroy fallen fruit, the effects of Black Rot on the fruit will be materially lessened.

Sun Scald.—Frequent cases of this form of injury are met with. It is sometimes seen on apple trunks, but may also be found on the larger limbs. Sun scald often follows an attempt to put an old neglected orchard into bearing condition. The trees are cut off so as to take away all the limbs above convenient spraying and picking height, and if this pruning is injudiciously done many of the large limbs are left exposed. In early spring the upper sides of these limbs are heated by the hot midday sun, and either because of frost which follows at night or because of inability to obtain water from the still frozen soil theses exposed areas are killed. The liability to scald may be greatly lessened by a coat of whitewash applied to the trunk and limbs. This reflects the heat from the surface and thus avoids exposure to extremes of temperature.

Collar Rot is another form of injury to apple, pear, plum and peach tree, brought about by winter conditions. The loss due to it from year to year is far more than is generally recognized, and it is apt to occur on trees just when they should have a long bearing period before them. Late cultivation which retards ripening of the tissues is conducive to the trouble, and it is worst in wet undrained soils, soils lacking in humus, and those which are hard and earthy. Mulches of straw and manure or even soil give a protection against collar rot. While numerous cases of collar rot have been met with in apples, pears also suffer considerably, and Japanese plums are quite susceptible to it under the conditions mentioned.

PEAR.

Pear Blight (*Bacillus amylovorus* De Toni).—This disease has made such serious inroads to the pear orchards of the Niagara peninsula that many of the more susceptible varieties have been given up as a profitable crop, and the entire acreage of pears has been greatly reduced in spite of the uniformly good prices that this fruit brings. The disease varies in virulence from year to year according to weather conditions which greatly affect its spread, and it is also worse in some districts than in others. In the recent summer the St. Catharines region had little or none, while quite a few orchards at Beamsville, Grimsby, and Stoney Creek were badly attacked. Control measures involve rigorously cutting out all parts affected by blight as soon as it appears, and it is especially advisable to go over the trees

carefully in the winter and cut out every speck of blighted wood so that the chances of spring infection may be lessened as much as possible. During the summer all blight prunings should be made by a knife dipped after each cut in corrosive sublimate (1-1000) so as to preclude carrying infection from tree to tree. In orchards where blight is bad, as a preventive measure it is generally found that it is better to do as little cultivation as will ensure the proper development of the fruit and to avoid all means which tend to produce soft sappy growth.

Pear Leaf Spot (*Septoria piricola* Desm.) occurs all over the peninsula, but ordinarily when the dormant spray of lime-sulphur as described under the apple has been thoroughly applied there is little or no trouble from this cause.

Scab (*Ventura pirina* Aderh.) is found to be hard to control on several susceptible varieties such as Flemish Beauty, Duchess, Sheldon, Seckel, and Anjou. It has been found, however, that the treatment given for Apple Scab is effective in controlling Pear Scab as well.

Collar Rot.—As noted under the apple, the pear is often killed by collar rot, especially where the soil is wet, and lacking in humus.

QUINCE.

Rust (*Gymnosporangium* L. *globosum* Farl.).—Quinces are not grown very extensively in the Niagara peninsula, but among the numerous small orchards found throughout the district the chief disease which affects this fruit is the Rust. The prevalence of this disease is directly attributable to the occurrence everywhere of the red cedar on which a part of the life cycle of the Rust is passed. The most obvious method of control would be to destroy all the cedar trees within the possible limits of infection. It has been stated on good authority that the spores may travel a mile or more, so that the destruction of this source of infection could only be carried out by concerted action of neighbouring owners or else by municipal regulation. It is doubtful if under existing circumstances this method of dealing with the disease would be feasible. It has been claimed that Bordeaux mixture applied at the infection period which is about the last of April or the first of May will give satisfactory control of the disease.

Black Rot of Fruit and Leaf Spot (*Fabræa maculata* Atk.) (=*Entomosporium maculatum* Rev.).—These are due to the same fungus. Neither is at all prevalent where the dormant spray of lime-sulphur is used.

CHERRY.

Black Knot (*Plowrightia morbosa* Sacc.).—A good deal of Black Knot still exists throughout the peninsula, principally in small gardens, waste places, and neglected farms. In the large commercial orchards it is practically non-existent, and no trouble is experienced in keeping them free from it by the simple expedient of cutting out all knots as soon as they appear. The winter pruning is usually sufficient, but as spores are formed twice in the season, once in early spring and again in late fall, greater security from infection is obtained by an additional summer inspection and removal of the knots.

Brown Rot (*Sclerotinia fructigena* Schr.).—Little attempt has been made to keep this disease in check, and yearly there is a considerable loss from it, mainly among sweet cherries. In 1913 a few days of moist warm weather just at the end of the sweet cherry season resulted in a large amount of rot.

Shot Hole (*Cylindrosporium padi* Karst).—This leaf affection is more or less universal on the cherry, and while it is usually not sufficiently severe to warrant the

expense of spraying, yet in certain cases trees are almost completely defoliated by it. When infection occurs at the time when the leaf is expanding the affected portion dries up and falls out, producing the true 'shot hole,' but infection later on in the season may only result in the formation of leaf spots. Control should include the dormant spray of lime-sulphur in the spring and the destruction of affected leaves. Where further measures are needed, half-strength Bordeaux made alkaline by excess of lime may be used, but there is danger of burning the leaves, especially in hot dry weather, if the ordinary mixture is applied.

PEACH.

Leaf Curl (*Exoascus deformans* Fuckel).—A few bad cases of Leaf Curl were noted in 1913, and in every case where the disease was met with, the controlling spray of lime-sulphur had either been carelessly applied or had not been applied soon enough in the spring.

Canker.—The Gummosis cankers of the peach are quite prevalent throughout the peninsula, and while no notable increase in their number took place during the year, those already formed made their usual yearly increase in size. On account of the prevalence of cankers at the bases of twigs killed by Brown Rot and other fungi, it is advised that care be taken to carefully remove these every summer so that conditions may not be left which are favourable to canker formation the following spring. Treatment of cankers which infest the main trunks or limbs of trees is well worth while. These should be carefully cleaned out, washed with corrosive sublimate (1—100) and when dry painted with ordinary lead paint.

Mildew (*Sphærotheca pannosa* Lév.).—The ordinary commercial varieties are very little troubled with this disease, but a few varieties are very susceptible to it. The Toronto and Brecken are badly attacked and often serve as sources of infection to other nearby trees which would of themselves be immune. The disease is readily controlled by dusting with flowers of sulphur or by the use of self-boiled lime-sulphur applied when the first signs of the disease appear. It is found that none of the susceptible varieties possess sufficient advantages over the immune varieties to warrant their retention under conditions that necessitated yearly spraying, so that they are being quickly discarded by all practical growers.

Yellows and Little Peaches.—Under the efficient system of inspection now employed by the Provincial Government, these diseases have during the last three years undergone a remarkable and encouraging decrease, and it is hoped that in ensuing years the percentage of trees destroyed from this cause will become very small.

PLUM.

Brown Rot (*Sclerotinia fructigena* Schr.).—Still continues to take its toll of the plum crop, and was sufficiently serious during 1913 to warrant attention. An attempt to deal with this disease requires: (1) the destruction of rotten fruit by ploughing deeply under, in fall or early spring; (2) the removal and destruction of the mummies from the trees; (3) a cleansing spray of lime-sulphur (1.303 sp. gr.) before growth starts, to kill all spores adhering to the bark and limbs; (4) summer spray to prevent infection from spores which have escaped (1), (2) and (3), or others which may be brought in from elsewhere. For this spray self-boiled lime-sulphur is recommended. According to Scott, the first spraying should be given about three weeks after the petals fall, the third a month before the fruit ripens, and the second midway between the first and third.

Shot Hole (*Cylindrosporium padi*, Karst.).—With the exception of Japanese varieties, plums are not usually seriously affected by shot hole. In the Japanese var-

ieties there is a good deal of the shot hole effect on weak or unhealthy trees, but on ordinary plums the fungus only attacks the leaves late in the season when they are declining in vigour. Under these conditions leaf spot is only produced as a rule.

Sun Scald.—An injury similar to that discussed under the apple is very common on plums throughout the Niagara district. The part usually affected in this case is the trunk, and whole orchards may be found in which the trunks of all the trees have dead strips on the south or southwest sides. The injury is caused by winter conditions and, as in the case of apples, whitewash applied to the trunks in fall or early winter helps to prevent it. Trees already injured should have the dead areas cut out and painted.

W. A. McCubbin.

ACKNOWLEDGMENTS.

In concluding this report I desire to express my indebtedness to the members of my staff who have, through their industry and close attention to their duties, considerably aided me in the carrying out of various phases of research and other work of the Division.

H. T. Güssow,
Dominion Botanist.

March 31, 1914.

Ottawa.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF ENTOMOLOGY

FOR THE

Fiscal Year Ending March 31, 1914

PREPARED BY

The Dominion Entomologist. - - - - - - - - - - - - - - C. Gordon Hewitt, D.Sc.

851 OTTAWA.

REPORT OF THE DIVISION OF ENTOMOLOGY.

BY C. GORDON HEWITT, D.Sc., DOMINION ENTOMOLOGIST.

OTTAWA, March 31, 1914.

J. H. GRISDALE, Esq., B.Agr.,
Director, Dominion Experimental Farms.
Department of Agriculture, Ottawa.

SIR,—I have the honour to submit herewith my fifth annual report of the work of the Division of Entomology covering the work beginning April 1, 1913, and ending March 31, 1914. In addition to a brief account of the progress and results of the investigations which have engaged the attention of the staff of the Division, both at headquarters and in the field, reference is also made, for the purposes of record and for the use of other workers, to the depredations of those insects which were unusually abundant and injurious during the year 1913.

The greater part of the investigation work is now carried out at the various field or regional laboratories located in different regions of Canada. Naturally, they are situated in the districts where the insects under investigation occur most abundantly. During the year, laboratories were established in three new regions, namely: Strathroy, Ont.; Treesbank, Man.; and Lethbridge, Alta. The following is a list of the field laboratories now established, together with the investigations which are being carried out at each station:—

BRIDGETOWN, N.S.—Mr. G. E. Sanders in charge. Investigations on the bionomics of the Brown-tail Moth and its control; introduction of parasites of the Brown-tail and Gipsy Moths; the Bud Moths and Green Fruit Worms of the apple.

FREDERICTON, N.B.—Mr. J. D. Tothill in charge. Control work and investigations on the Brown-tail Moth and the introduction and establishment of its parasites and predaceous beetles; investigation of the natural control by parasitic and predaceous insects of the Tent Caterpillar, the Fall Web-worm and Spruce Budworm.

COVEY HILL, QUE.—Mr. C. E. Petch in charge. Apple insects, especially the Apple Curculio (*Anthonomus quadrigibbus*); Grasshopper control by bacterial disease (*Coccobacillus acridiorum* d'Herelle).

JORDAN HARBOUR, ONT.—W. A. Ross in charge. Apple Maggot (*Rhagoletis pomonella*); Apple and other aphids; control of greenhouse pests; control of mill-infesting insects.

STRATHROY, ONT.—Mr. H. F. Hudson in charge. Investigation of White Grubs (*Lachnosterna* spp.); Wireworms and insects affecting field crops.

TREESBANK, MAN.—Mr. N. Criddle in charge. Investigation of White Grubs (*Lachnosterna* spp.); and chief insects affecting cereals; Hessian Fly, Wheat Stem Maggots (*Oscinis* spp.), Wheat Stem Sawfly (*Cephus occidentalis*) and Grasshoppers.

LETHBRIDGE, ALTA.—Mr. E. H. Strickland in charge. Cutworms affecting cereals and field crops; injury to winter wheat involving a study of Eelworms.

AGASSIZ, B.C.—Mr. R. C. Treherne in charge. Completion of investigation of Strawberry Root Weevil (*Otiorhynchus ovatus*); investigations on Lesser Apple Worm; Budmoths and other insects affecting apple: Wheat Midge (*Diplosis tritici*?) and Root Maggots.

Mr. L. S. McLaine, through the cordial co-operation of Dr. L. O. Howard, Chief of the Bureau of Entomology of the United States Department of Agriculture, and of Mr. A. F. Burgess, in charge of the Gipsy and Brown-tail Moth work, was located at the Gipsy Moth Parasite Laboratory, Melrose Highlands, Mass., during the summer, for the purpose of collecting caterpillars and breeding out the parasites which were shipped to Fredericton, N.B., as will be described later.

Apart from the importance of the numerous lines of inquiry which are being followed at the various field stations, the value of this progressive policy has been experienced and appreciated in other directions. The officers in charge are able personally to visit and advise local agriculturists, to attend and address meetings and, not infrequently when an outbreak of an insect is reported to us, we are able to have the matter immediately investigated to the greater satisfaction of all concerned. A personal visit from an officer of the department gives far more satisfaction than the receipt of a letter of advice. In many cases the officer can give advice when the same could not be sent from this office owing to lack of definite information. A visit from a medical man is more valuable than a diagnosis and prescription obtained by the use of the mails.

As in previous reports, the work of the Division will be considered under the following sections:—

I. The administration of the Destructive Insect and Pest Act, including:—

(*a*) Inspection and fumigation of imported nursery stock, etc.
(*b*) Field work against the Brown-tail Moth and parasite work.

II. Insects affecting cereals and field crops.
III. Insects affecting fruit crops.
IV. Insects affecting forest and shade trees.
V. Insects affecting domestic animals and man.
VI. Insects affecting garden and greenhouse.
VII. Apiculture.
VIII. Miscellaneous.

I. THE ADMINISTRATION OF THE DESTRUCTIVE INSECT AND PEST ACT.

Amendments to Regulations.

The following amendments to the regulations under the Act have been made by Order in Council during the past year:—

October 8, 1913.—North Portal, Sask. was declared a port of entry for imported nursery stock, the importation season being March 15 to May 15 and October 7 to December 7.

December 4, 1913.—The following new regulation prohibiting the importation of nursery stock through the mails was passed, to take effect on and after March 1, 1914. This was necessitated by the impracticability of intercepting mail shipments for the purposes of inspection and fumigation:—

18. "The importation of all nursery stock, including trees, shrubs, plants, vines, grapes, scions, cuttings, or buds, through the mail is prohibited, excepting greenhouse-grown florists' stock, cut flowers, herbaceous perennials, and bedding plants, which will be admitted provided that a detailed statement of the contents is attached to such parcels." This regulation is to take effect on and after the 1st day of March, 1914. The words "Importations by mail shall be subject to the same regulations" in regulation 3, line 14, are struck out.

February 14, 1914.—In order to permit the entry of European nursery stock through the port of St. John, N.B., during the whole of the winter, as the regulations did not permit such entry during the period December 8 to March 14, section 6 was amended to read as follows—

6. "Nursery stock, not including such stock as is exempt under section 3 of these regulations, originating in Europe, shall be imported only through the ports and with the exception of St. John, N.B., during the periods specified under section 3 for stock requiring fumigation, with the addition of the ports of Halifax, N.S., Sherbrooke, Que., and Montreal, Que., through which ports and also the port of St. John, N.B., such European stock may enter from September 15 to May 15. Such European nursery stock, and such other imported vegetation as the minister may determine, entering Canada, shall be exempt from fumigation, but shall be inspected either at the port of entry or at its destination to which it may be allowed to proceed, but in the latter case it must not be unpacked except in the presence of an inspector."

March 7, 1914.—Owing to the repeated discovery of potatoes imported from California into British Columbia which were infested with the Potato Tuber Moth (*Phthorimaea operculella* Zett.), to which reference is made later in this report, this insect was scheduled under section 12 of the regulations, and section 13 was amended to include the state of California among those states and countries from which the importation of potatoes is prohibited.

New Plant Quarantine or Fumigation Stations.

The natural growth of the country results in an increase in the quantity of fruit and shade trees, ornamental and other shrubs and plants imported into Canada. To met this increase and to facilitate the importation of such natural products, increased accommodation is being provided for the fumigation and inspection of imported nursery stock.

St. John, N.B.—At St. John, N.B., a new fumigation and inspection station has been constructed adjoining the Eastern Steamship Company's wharf. It consists of a large fumigation chamber measuring 25 feet long, 10 feet wide and 8 feet high, an inspection and packing room, a small fumigation chamber of 100 cubic feet capacity, and an office.

Niagara Falls, Ont.—In order to provide increased accommodation at Niagara Falls, Ont., through which port most of the nursery stock for Ontario enters, an additional station has recently been erected at Montrose, on the Michigan Central Railroad. This building, which measures about 45 feet square, contains two large fumigation chambers, each 20 feet long, 10 feet wide, and 8 feet high, a small fumigation chamber of 100 cubic feet capacity, and an office. In addition, provision is made to permit the inspection of plants.

North Portal, Sask.—Previous to 1913, all shipments of nursery stock destined to points in the prairie provinces entered *via* Winnipeg, which was the port of entry, and were fumigated there. The increase in the amount of nursery stock imported into the

provinces of Saskatchewan and Alberta, and the delay necessitated by the routing of shipments of stock from certain of the states exporting trees to Canada, made it desirable to establish an additional port of entry and plant quarantine station in the West. Accordingly, a new station has been erected at North Portal, Sask., on the Canadian Pacific railroad. This station consists of two fumigation houses, each measuring 20 feet long, 10 feet wide, and 8 feet high, a small fumigation chamber of 100 cubic feet capacity, and an office. The additional facilities so provided will prove a great advantage to importers of trees residing in the provinces of Saskatchewan and Alberta, by reducing the time taken in transit by shipments of nursery stock. It is hoped that it will encourage further tree planting in these western provinces.

Inspection and Fumigation of Imported Nursery Stock.

The inspection of all nursery stock from Europe, Japan, and the New England States has been continued, and during the importation season of 1912-13, which closed in May, 1913, over four million trees and plants were inspected. The adjoining table shows the nature of the stock inspected and its destination, according to provinces. The figures given are taken from the reports of the inspectors.

Nursery Stock Inspected during the importation season 1912-13.

—	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.
Ornamentals		14,672	2,731	106,374	601,170	5,253		12	252,767
Fruit trees		9,6	900	373	51,975				1,081
Small fruits		3,916	12	3,660	82,099			100	5,477
Shade trees		836	616	9,613	78,408				1,093
Unclassified shrubs	25	388		5,816	2,151	1,975	59,322	33,550	9,031
Seedlings		194,162		33,700	1,776,164				87,100
Conifers		2,720		2,835	421,222	200			552
Forest stock		2,475							
Grafting stock		6,600		1,225	189,100				12,000
Totals	25	226,145	4,259	163,596	3,202,289	7,428	59,322	33,662	369,101

The recent institution of inspection services by the respective Governments in various European countries, including Great Britain and Ireland, exporting nursery stock to Canada, and in the New England States and Japan, has resulted in our receiving a much better class of nursery stock, and a marked freedom from insect pests. The discovery of evidences of Brown-tail Moth infestation and the presence of Woolly Aphis and scale insects on imported stock necessitate a constant vigilance on the part of our inspectors. However carefully the inspection of foreign nurseries, or of exported shipments is carried on, those who have had any practical experience in the inspection of nurseries and trees will realize the importance of a careful second inspection of the plants on arrival.

The inspection of imported plants is carried on either at the port of entry, usually in the case of small shipments for distant points, or at the destination. During the past year Mr. J. Perrin was appointed an inspector to inspect shipments arriving at Halifax.

An approximate record only is kept of the amount of nursery stock fumigated. This exceeds very considerably the amount inspected, as it includes all the nursery stock imported from the United States, which constitutes our chief source of supply.

Ottawa.

It is most gratifying to observe the increasing quantity of nursery stock imported into the prairie provinces. The number of trees inspected has been given in the previous table. The following figures indicate the amount of nursery stock subject to fumigation that was imported into the prairie provinces alone; practically all of this stock originated in the United States:—

	Manitoba.	Saskatchewan.	[illegible]
Ornamental shrubs	60,684	29,506	14,462
Small fruits	13,618	7,840	1,657
Shade trees	98,693	116,732	14,285
Fruit trees	8,417	4,360	1,882
Cuttings	25,195	127,840	22,500
Conifers	8,549	3,339	5,865
	215,156	289,617	60,651

These figures not only indicate the proportion of nursery stock fumigated as compared with the quantity inspected (see previous table), but afford strong evidence of the efforts which are being made to make the prairie farms less treeless.

Field Work against the Brown-tail Moth, 1912-13

NEW BRUNSWICK.

During the winter of 1911-12 seven counties were found to be lightly infested with the Brown-tail Moth. Owing to the unfavourable weather conditions prevailing in July, 1912, when the moths were flying in the adjoining states, which prevented any invasion of the female moths, and to the careful scouting work during the previous season, an unusually small number of winter webs was collected.

The scouting work commenced on November 22, 1912, and terminated on February 3, 1913. The field force consisted of eight men, the Dominion and Provincial Governments each employing four men. Mr. J. D. Tothill had charge of the work, assisted by Mr. A. B. Baird. The whole of the area infested in the previous year was scouted, but only eighty-one new winter webs were found and the remains of twenty-seven webs of 1911. Eighty of the new winter webs were found in Charlotte county, and a single nest occurred in Queens county.

The distribution of the Brown-tail Moth on the food plants in New Brunswick during the season 1912 was as follows:—

Apple	57	Elm	2
Amelanchier	6	Plum	1
Thorn	6	Oak	1
Choke Cherry	4	Maple	1

The fact that in Charlotte county 1,512 winter webs were collected in 1911, and only 80 were found in 1912 indicates the value of the thorough scouting work which was carried out, and that were counties in New Brunswick not subject to an annual invasion of moths from the adjoining states during the flying season any unusual increase in the infestation could be checked. In 1913, however, an immense flight of moths took place in July, and the inspection work of the present season (1913-14), of which Mr. L. S. McLaine, with the assistance of Mr. A. B. Baird, has charge, has disclosed a very heavy infestation and a great increase of the infested area. The results of the inspection work of the past winter 1913-14 now being brought to a close will be given in my next annual report.

Ottawa.

NOVA SCOTIA.

Mr. G. E. Sanders had charge of the scouting work in this province during the winter of 1912-13. It was found that the infestation had spread in an easterly direction, single winter webs being found at Sheffields Mills, Kings county, and Falmouth, Hants county. The number of new infestations, however, was less than the previous season. There was an increase in the number of winter webs collected, 11,054 webs being found in an area which included portions of the five counties from Yarmouth to Hants.

The distribution of the winter webs according to food plants in Nova Scotia was as follows:—

Apple	9,755	White Birch	9
Pear	359	Beech	4
Thorn	338	Wild Cherry	2
Plum	327	Elder	1
Wild Pear	122	Poplar	1
Oak	80	Prune	1
Maple	16	Raspberry	1
Wild Rose	14	Alder	1
Elm	11	Quince	1
Sweet Cherry	11		

Mr. Sanders continued his investigations on the bionomics of the Brown-tail Moth under Nova Scotia conditions. One of the most serious problems is the dropping of the winter webs on to the ground, thus they escape collection. This "winter-drop" is being carefully studied in all its aspects. Winter webs were placed on the ground in different localities and left from December, 1912 to April, 1913. The greatest winter-kill in any of the lots of 25 webs was 7·57 per cent, practically a negligible quantity. Having demonstrated the ability of larvæ in dropped nests to survive the winter on the ground practically unharmed, experiments were carried out with a view to ascertaining whether such larvæ could find food on the ground, and whether or not they could successfully reach suitable trees. It was found that they would thrive on the ordinary herbage such as clover, timothy, dandelion, wild strawberry, etc., for forty-four days, which was a sufficient length of time to enable them to travel 300 feet or more on the ground and reach suitable trees. Altogether, 3,529 young caterpillars out of 5,365 used in the experiments, or 65·7 per cent., found the trees under conditions which unusually occur in the field.

This ability to survive in winter webs which drop to the ground before winter explains many cases of re-infection that are otherwise inexplicable. Field observations showed that the percentage of nests hanging by a single thread and ready to drop would sometimes be as high as 20 per cent. The results of our scouting work from year to year indicate that the successful control of the Brown-tail Moth is possible by our present methods of thorough scouting were it not for the re-infestations which take place by moths being carried over by the wind from the New England States, and our present inability to deal with the problem of the dropped nests to which we are giving our attention.

It is satisfactory to find from our scouting work that the infestation of the Brown-tail Moth in the orchards is least in those orchards where spraying is regularly practised. The occurrence of unsprayed orchards, thorn thickets and wild apple, etc., in various infested localities serves to supply a permanent breeding place where artificial control is difficult.

IMPORTATION OF PARASITES OF THE BROWN-TAIL AND GIPSY MOTHS.

The ultimate control of the Brown-tail Moth must necessarily be a natural one, and while we have, so far, successfully held the insect in check by thorough scouting work and the collection of the winter webs, the natural spread of the moth from the

infected area in the New England States will render such methods less potent in dealing with the insect outside the orchard and cultivated areas. Our efforts are directed with a view to keeping the insect in check, so far as is practicable. In my last annual report the preliminary efforts to introduce the native parasites of the Brown-tail and Gipsy Moths into Canada were described. Through the continued courtesy and most welcome co-operation of Dr. L. O. Howard, Chief of the United States Bureau of Entomology, and of his assistant, Mr. A. F. Burgess, in charge of the Gipsy Moth Work, we were able to make more extensive importations of parasites during the summer of 1913. This was made possible by the very kind provision of accommodation at the Gipsy Moth Parasite Laboratory, Melrose Highlands, Mass., for our officer, Mr. L. S. McLaine, who had charge of the work of obtaining the parasitized material.

COLLECTION OF PARASITES.

The parasites which we were desirous of obtaining were: *Apanteles lacteicolor* Vier., which infests the hibernating caterpillars of the Brown-tail Moth; and the Tachinid parasite *Compsilura concinnata* Meig., which we had successfully introduced into New Brunswick in 1912. These parasites will attack both the Gipsy and Brown-tail caterpillars, and the caterpillars of several of our native lepidoptera upon which fact the success of work in introducing and establishing them depended. We also desired to obtain further supplies of the predaceous beetle *Calosoma sycophanta,* which successfully withstood the winter of 1912-13 at Fredericton.

During the winter of 1912-13, 6,500 parasitized winter webs of the Brown-tail Moth were collected from six localities in Massachussetts, and placed in cold storage. On May 6, they were removed and the young larvæ were fed in Fiske trays. The first *Apanteles* cocoon appeared on June 1. The work of feeding and picking over the trays was an almost intolerable operation on account of the poisonous hairs and great heat. Mr. McLaine and his helpers deserve great credit for the admirable way in which this work was carried on under most trying circumstances. As the cocoons of *Apantelcs* were collected they were put into an ice-box until a sufficient number had been obtained to ship to our laboratory at Fredericton, N.B. It was found that the best method of shipping the cocoons was in iced refrigerator boxes by express. The Tachinid parasite *C. concinnata* was reared from Gipsy Moth caterpillars in preference to Brown-tail Moth caterpillars to avoid the hairs of the latter. The caterpillars were collected as near the fifth stage as possible to reduce the labour of feeding. The first collection was made on June 25. In order to facilitate the collection of the caterpillars, trees were burlapped in four localities. The caterpillars were fed in Fiske trays and the first *Compsilura* puparium was noted on July 2. The following is a summary of the results:—

> Caterpillars from 6,500 Brown-tail Moth winter webs reared, from which 46,548 cocoons of *Apanteles lacteicolor* were obtained and forwarded to Fredericton, N.B.; a total of 49,119 Gipsy Moth caterpillars from ten localities were fed, from them 5,738 puparia of *Compsilura concinnata* were obtained and shipped to New Brunswick. Early in June 200 adults of the predaceous beetle *Calosoma sycophanta* were collected and shipped to New Brunswick. In addition, 975 larvæ of *Calosoma* in all stages were collected in various localities and fed in the laboratory until they entered the ground for pupation; they will hibernate at Melrose Highlands and be shipped later to Fredericton, N.B.
>
> There were also shipped to New Brunswick 475 cocoons of the parasite *Meteorus versicolor* Wesm., which is an imported parasite of the Brown-tail Moth, and also parasitizes the caterpillars of the White-marked Tussock Moth and the Fall Webworm.

Ottawa.

COLONIZATION OF PARASITES.

The parasites and predaceous beetles were received and distributed in colonies in New Brunswick and Nova Scotia by Mr. J. D. Tothill. The following table gives the location and strength of each of the colonies distributed. All the colonies are strong ones with the exception of the single colony of *Meteorus*.

DISTRIBUTION OF IMPORTED PARASITES AND BEETLES IN 1913.

Species.	Location of Colony.	Size of Colony.
Compsilura concinnata	Fredericton, N. B.	1,238 puparia.
"	Nerepis, N. B.	1,500 "
"	St. Stephen, N. B.	1,500 "
"	Bear River, N. S.	1,500 "
Apanteles lacteicolor	Whittier Ridge, N. B.	4,499 adults.
"	Basswood Ridge, N. B.	7,000 cocoons.
"	St. Stephen, N. B.	7,000 "
"	Nerepis, N. B.	3,391 "
"	Bear River, N. S.	7,000 "
Calosoma sycophanta	St. Stephen, N. B.	100 adults.
"	Whittier Ridge, N. B.	100 "
Meteorus versicolor	Whittier Ridge, N. B.	475 cocoons.

It is gratifying to note that the larvæ of the beetle *Calosoma,* which were reared by Mr. Tothill in 1912 and allowed to go into hibernation at Fredericton, N.B., successfully withstood the winter of 1912-13, which was severe owing to the snowfall being less than usual and the occurrence of very low temperatures.

APANTELES IN NOVA SCOTIA.

Winter webs of the Brown-tail Moth collected in Nova Scotia during the season 1912-13 were kept and the larvæ emerging from them were fed in Fiske trays at the laboratory at Bridgetown, N.S., with a view to ascertaining whether any native parasitic insects were attacking the Brown-tail Moth caterpillars. Caterpillars from winter webs collected at Bear River, N.S., were found to be parasitized with a species of *Apanteles*. Specimens of the *Apanteles* were submitted to Mr. A. F. Burgess of the Gipsy Moth Parasite Laboratory, Melrose Highlands, Mass., for determination, who reported on July 9, as follows: "The specimens of *Apanteles* have been examined by Mr. Summers and checked up with specimens which we have here and the description which was drawn up by Mr. Viereck for *Apanteles lacteicolor*. The description is somewhat vague, but the specimens tally very well with other specimens of *lacteicolor* which we have here at the laboratory, and we therefore believe it to be that species."

The pleasure the discovery of the occurrence of this species of parasite in Nova Scotia created was only a little greater than the mystery surrounding the reason for such occurrence. It cannot have reached Nova Scotia by natural spread. Either it was introduced with winter webs of the Brown-tail Moth on plants carried from Massachusetts prior to 1910, after which dates such plants have been inspected, or *A. lacteicolor,* or a species of *Apanteles* most closely resembling *lacteicolor,* is native to Nova Scotia. In any case it augurs well for the future of the colonies of *A. lacteicolor* which we are introducing into the province.

PARASITES OF NATIVE INSECTS.

In addition to the work connected with the importation and colonization of the parasites of the Brown-tail and Gipsy Moths, Mr. J. D. Tothill continued at the

Entomological Field Laboratory at Fredericton, N.B., the detailed study which he is making on the natural control of the Forest Tent Caterpillar (*Malacosoma disstria*) and the Fall Webworm (*Hyphantria cunea*). Observations were also made on the parasites of the Spruce Budworm (*Harmologa fumiferana*) in New Brunswick. Such an intensive study as is being undertaken is necessary in order to ascertain the manner in which the natural control of certain of our more common insect pests is brought about and maintained, and the conditions governing the same. Until we have such information our attempts to imitate or assist the natural control of insect pests cannot be undertaken on the sound scientific basis which success demands. No one can foretell to what practical uses it may not be possible to put the results of knowledge so gained. Among the important questions involved is whether in all cases a complete sequence of parasites is required. No one species of parasite can secure the natural control of the insect. Natural control involves the destruction of a greater number of individuals of the species than are produced by unrestricted increase. This destruction is brought about by numerous causes, the chief of which are parasitic and predaceous insects. Other causes are diseases caused by micro-organisms of a bacterial and protozoal nature, fungi, or physiological troubles. Usually, the parasitic insects form a sequence, different species of parasites attacking the insects in the different stages of its development. Some attack the egg, others the young larvæ or older larvæ, and other species attack the pupating larvæ or pupæ. These facts will indicate, perhaps, the complexity of the problem and the nature of the information necessary for its solution or understanding.

Egg masses of *Malacosoma disstria* were collected in different localities in New Brunswick, Quebec, and Ontario, and four species of egg parasites were reared and studied. One of these species, known as No. 4, is evidently an important factor in the natural control of the insect. It is an obligate parasite; the highest percentage of parasitism for a locality was 9·85 per cent., but individual egg masses were parasitized sometimes to the extent of 50 per cent.

In the study of the parasitism of *Hyphantria*, many thousands of caterpillars collected from different localities were fed and dissected for larval parasites, and the percentages of parasites from different localities were obtained by dissection, and rearing. These parasites were mainly *Apanteles, Meteorus, Limnerium validum, L. pilosulum, Varichoeta aldrichi* Towns., and *Exochilum mundum* Say.

Mr. Tothill also studied the habits of the native ant *Formica ulkei* Emery, which, together with other ants, may exercise an appreciable influence in the natural control of certain species of lepidoptera upon which they prey.

II. INSECTS AFFECTING CEREALS AND FIELD CROPS.

Cutworms.

In view of the remarkable abundance of these caterpillars in southern Alberta, a brief account of which I included in my last report, much information has since been gathered on the life-history, habits, etc., of the species mainly responsible for the damage, viz., *Porosagrotis orthogonia* Morr. (referred to in previous publications of the Division as *Porosagrotis delorata* Sm.). In April last (1913) Mr. Arthur Gibson visited Alberta and made a thorough investigation of the infested districts. In company with Mr. E. H. Strickland, the resident Field Officer of the Division, he found the cutworms fairly numerous throughout the Lethbridge district. They were particularly present in fields of spring wheat, fall wheat, and oats. In some places, as for instance at Iron Springs, Alta., they were present in certain fields in numbers varying from three to eleven to the square foot. A series of control experiments was started early in May. Infested fields were divided into various sized plots (none smaller

than one-tenth of an acre). Upon such land moistened bran poisoned with various strengths of Paris green, London purple, and arsenate of lead, was broad-casted. Owing to the dull, cool, backward spring, however, the cutworms were not feeding ravenously and in many of the experimental plots not more than 20 per cent of the cutworms were killed. From observations made by Mr. Strickland, too, it would appear that the *Porosagrotis* cutworm feeds just below the surface of the soil. If this underground feeding habit should prove constant, we cannot, of course, expect applications of poisoned bran, shorts, etc., to prove a perfect remedy. Further experiments in control will be made whenever the cutworms again become active. The actual damage effected by the cutworms in southern Alberta during 1913 was not nearly so great as that of the preceding year. One correspondent living at Magrath estimated that he lost 50 per cent of his crop in 1912.

In Manitoba, Ontario, and Quebec, the Red-backed Cutworm (*Euxoa ochrogaster*) was reported to have been particularly abundant in fields of cabbage, etc. From New Brunswick reports were received of injury by the Greasy Cutworm (*Agrotis ypsilon*), especially in fields of potatoes, many of which were seriously injured.

The Army Worm (*Leucania unipuncta*).

It is important to record the reappearance of the true Army-worm during 1913. In early August, Mr. Norman Criddle reported that the larvæ were in great abundance in a large field of oats near Treesbank, Man. An interesting observation was that the caterpillars were also readily devouring the Green Foxtail (*Setaria viridis*). Reporting later on the outbreak, Mr. Criddle estimated the greatest amount of damage would reach 50 per cent, and the average on infested fields about 20 per cent. Farmers in Manitoba should watch for the appearance of the Army-worm in 1914 and report occurrences at once to the Division. There are two annual broods of the Army-worm, the moths appearing in June and again in August and September. The moths which appear in June lay their eggs, and it is the caterpillars from this brood which appear in July and August which are the most destructive.

Locusts.

In eastern Ontario, Quebec, and southern Manitoba, considerable loss was occasioned from the ravages of locusts, particularly in light, sandy areas. At Bowesville, near Ottawa, a serious outbreak occurred, which we investigated in July. Two species of destructive locusts were present, namely, the Lesser Migratory Locust (*Melanoplus atlanis* Riley) and the Pellucid Locust (*Camnula pellucida* Scudd.), the former particularly being present in very large numbers. Fields of oats, barley, timothy, rye, and corn were being devastated, large areas being entirely eaten; beans, potatoes, and carrots were also attacked.

At our Entomological Field Station at Covey Hill, Que., a series of experiments was begun by our Field Officer, Mr. C. E. Petch, on the destruction of locusts with the Grasshopper Coccobacillus (*Coccobacillus acridiorum* d'Herelle), the original culture of which was received through the kindness of the Director of the Pasteur Institute, Paris, France. Successful inoculations were made at Covey Hill and later a supply of infected bouillon was received at Ottawa, and this was sprayed directly over the grasshoppers at Bowesville, Ont. Unfortunately, however, owing to a delay of some hours in the arrival of the bouillon at Ottawa, together with unfavourable weather conditions, it was not expected that infection would take place in the field. We hope to receive further cultures from France and to continue the experiments during the spring and summer of 1914. At the Covey Hill Field Station over 400 locusts were inoculated in the laboratory, five of which died within three hours, indicating that the *Coccobacillus* was pathogenic in the case of our native species of locusts.

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In Manitoba, wherever applications of the Criddle Mixture were made, little damage was caused by the locusts.

White Grubs (*Lachnosterna* spp.).

An extended investigation into life-history, control, etc., of these insects is now being undertaken by the Division in co-operation with the United States Bureau of Entomology.

At several of the field stations, important studies have been made of the various species of White Grubs destructive to field and garden crops. Large collections of the adults have been made from various plants in Ontario and Manitoba, and the life-histories of the different species are being investigated. Mr. Norman Criddle, of Aweme, Man., was appointed a Field Officer of the Division to study particularly the Manitoba species of White Grubs. Six species were under observation at this station, and much data were obtained as to their habits, food plants, etc. Mr. H. F. Hudson, Field Officer at Strathroy, Ont., has found three species of common occurrence and at Vineland, Ont., Mr. W. A. Ross has noted two species.

As these insects require from two to four years to complete their life-cycle, the investigations now under way will not be completed until 1917 or 1918.

During 1913 many reports were received of injury by White Grubs. These were chiefly from British Columbia, Manitoba, Ontario, Quebec, and in mostly all instances the destruction was to potatoes.

Miscellaneous.

Wireworms.—These insects were reported as injurious from various parts of the Dominion. At Ottawa, in the comparative tests of Indian Corn on the Central Experimental Farm, the injuries of the larvæ of the Elaterid, *Cryptohypnus abbreviatus* Say, were discovered.

The Hessian Fly (*Mayetiola destructor* Say.).—A few complaints of damage by this insect were received from Manitoba, and a thorough study was begun of the life-history in that province. It was found to be plentiful at Reston, Man.

The Lesser Wheat-stem Maggot (*Oscinis carbonaria* Loew.).—This insect, which in Manitoba ranks in importance next to the Hessian Fly in injury to spring wheat, was also fairly abundant in some districts. At Treesbank, Man., Mr. Criddle estimated that the injury to spring wheat in June by this insect and the Hessian Fly averaged 5 per cent.; in some fields the damage was as high as 15 per cent.

The Pea Weevil (*Bruchus pisorum* L.).—From reports received, this insect is undoubtedly on the increase again. Samples of infested seed peas have been forwarded to the Division from localities in Ontario. No such infested seed, of course, should be used, either for food or planting, unless the same is fumigated with bisulphide of carbon to kill the beetles, many of which remain in the seed during the winter. If peas which have been injured by the Pea Weevil are used in spring for seed purposes, a very much larger amount per acre will be required. It is, of course, inadvisable to use injured peas for seed; such should be fed to stock.

The Clover-seed Chalcid (*Bruchophagus funebris* Howard).—During the winter of 1912-13 and that of 1913-14, seeds of Red Clover (*Trifolium pratense* L.) and strains from this and Mammoth Red, were found to be heavily infested with the larvæ and pupæ of the Clover-seed Chalcid. Fourteen samples of seed, each sample containing 500 seeds, were counted at random and it was found that the highest percentage of infestation was 21 per cent., and the lowest 9 per cent.; the average per-

centage of destroyed seed in the fourteen samples was 16 per cent. As far as we know, these are the first records of the insect having been found in clover seed grown in Canada.

The Carrot Rust Fly (*Psyla rosæ* Fab.).—In the Maritime Provinces the carrot and parsnip crops were considerably reduced by the larvæ of this destructive insect. In some districts in Prince Edward Island and New Brunswick, whole plantations were affected and the crops practically ruined. Correspondents who applied kerosene emulsion to the rows of young carrots reported that little loss was occasioned by the maggots.

Thrips.—The occurrence of "white-eared" oats in Saskatchewan and Alberta was again reported. It is evident that this injury, which my investigations have shown to be most frequently due, in eastern Canada at least, to the Common Grass Thrips (*Anaphothrips striatus* Osborn), is fairly widespread. In Alberta, Banner oats were particularly affected; it is usually found that the late-flowering varieties suffer most from Thrips injury.[1]

Root Maggots.—From all parts of the Dominion, reports have been received of the destruction of cabbages, cauliflowers, onions, turnips, radishes, beans, etc., by the different species of Root Maggots (*Phorbia* spp.). Experiments on their control have been continued at Ottawa, and Mr. R. C. Treherne has carried on experiments at Agassiz, B.C. As the experimental studies on the control of *Phorbia brassicæ* and *P. ceparum* have been continued each year since 1910, it is hoped that it will be possible to issue a bulletin on the subject during the next twelve months, after another season's work.

Wheat Midge (*Diplosis tritici?*).—Mr. Treherne studied this insect, which was very prevalent at Agassiz, B.C. Particular attention was paid to the occurrence of the larvæ in the different varieties of wheat and barley. In 1905 and 1906 the crops of spring wheat were seriously affected by the midge in the Lower Fraser valley, and in spite of discontinuing the growing of spring wheat for a year at Agassiz and in the valley in 1907, the insect was again present in 1908.

Injuries to Winter Wheat in Alberta.

In my last annual report (p. 507) reference was made to the discovery of Eelworms in injured wheat plants from southern Alberta. This matter was more fully investigated by Mr. E. H. Strickland, our Field Officer in Alberta, during the past summer, and in September I visited the districts where the injuries occurred. The extent of the injuries may be gathered from the following facts which I obtained in certain of the localities visited, which were typical of many others. Mr. W. J. Glass, of Macleod, Alta., one of the best growers of winter wheat, usually obtains an average yield in good seasons of 33 bushels per acre. In the fall of 1912 (August) he seeded 220 acres to winter wheat; cutworms destroyed a portion of the crop, but the greater portion died as a result of the injuries that we are investigating. Accordingly, he reseeded 100 acres to oats, and from 97 acres of winter wheat which was left he thrashed out only 162 bushels. Mr. Becker, of Pincher Station, had 400 acres sown to winter wheat, and in 1913 it averaged about 7 bushels to the acre instead of about 30 bushels. In one section of the infested land, only 150 bushels were thrashed off 100 acres. Similar losses were reported from this and other districts in southern Alberta.

The constant association of Eelworms with young injured plants led us to conclude in 1912 that they were responsible for the injuries. A further detailed study

[1] See C. Gordon Hewitt, "Sterility in Oats caused by Thrips." Journ. Econ Ent., vol. 7, pp. 211-218, 1 fig., 1 pl., 1914.

Ottawa.

during 1913, however, indicated that Eelworms might not be the sole cause of this serious and extensive trouble, and with a view to ascertaining what relation the Eelworms bear to the destruction of the winter wheat, Mr. Strickland is conducting as exhaustive an inquiry as possible into the whole matter. The comparative absence of information concerning the soil-infesting Nematodes of North America increases the difficulties surrounding this study. Dr. Ritzema Bos, Director of the Phytopathological Institute, Wageningen, Holland, and the leading European authority on Nematodes affecting plants, has very kindly examined living and preserved material which I sent to him. In dead portions of young winter wheat plants he found Eelworms of the genera *Cephalobus*, *Rhabditis* and living Anguillidæ, but he could not find any Nematode worm known as a plant parasite. Dr. J. G. de Man of Ierseke (Zeeland), a well-known specialist in Nematode worms, also kindly examined some of our material. He found neither in the fresh plants nor in the alcoholic material any forms known to be parasitic on plants; a species of *Tylenchus* allied to *T. dubius* Butschli, one *Dorylaimus* allied to the European *D. bryophilus* de Man, and a number of worms belonging to the genera *Cephalobus* and *Rhabditis* were found by him. Dr. Ritzema Bos believes that *Cephalobus* feeds saprophytically on plants destroyed by other Nematode worms or disease. The occurrence of three kinds of Nemotode worms in the soil, namely, non-parasitic which normally live in the soil and on the humus it contains, saprophytic which feed on dying decaying vegetation, and truly parasitic, which enter and feed upon the tissue of the living plant, makes the determination of the relationships of the various forms found a matter of unusual difficulty.

In addition, a fungus (*Fusarium* sp.) has been found which may have some relation to the trouble. It is not unlikely that climatic conditions are also concerned in the production of the injuries. These factors may also affect the young wheat plants conjointly. Whether the injury is caused by one factor or several factors working together, can only be discovered by further study, and we shall continue our investigations during the coming season on the relations of the various species of Nematode worms to the injured plants.

III.—INSECTS AFFECTING FRUIT CROPS.

Considerable progress was made in the investigations which are being carried on at the Entomological Field Stations. I have indicated earlier in this report (pp. 2-3) at what stations the different insects are being studied, and a brief statement of the progress of our studies will now be given.

Budmoths of Apple in Nova Scotia.

In the spring of 1913 a large amount of the damage to young fruit attributed to frost was due to Budmoth. In the Annapolis valley, Mr. Sanders has found two species of true Budmoths, the common Eye-spotted Budmoth (*Spilonota ocellana*), and a large species, *Olethreutes consanguinana*, was recorded for the first time feeding in apple. The life-histories of both these species have been studied, and the spraying experiments in the orchard of Mr. R. S. Eaton at Kentville, N.S., have been continued. The results of last year's (1913) spraying experiments cannot be obtained until May (1914), but the 1912 experiments indicated that the spray applied before the blossoms opened gave the greatest benefit of any single spray, killing from 50 to 60 per cent of the Budmoths. This spray, together with the spray applied after the falling of the blossoms, gave the best results: an increased set of 20 per cent more fruit was secured over that in the check plots.

Ottawa.

Fruit-worms in Nova Scotia.

For a number of years fruit-growers have complained of the damage caused by Fruit-worms and their inability to control them owing largely to ignorance of their habits. During 1913, Mr. Sanders continued his studies which were commenced in 1912, and found that instead of one species there were probably about twelve injurious species belonging to the genera *Xylina, Calocampa,* and *Scopelosoma.* By far the commonest species is *Xylina bethunei.* Their injury to the fruit is responsible for converting a large proportion of apples of grades Nos. 1 and 2 to grade No. 3.

The winter is passed in the adult state, the moths hibernating under rubbish, grass, etc. In the early spring the adults emerge and deposit their eggs on the apple twigs. The eggs hatch in about a fortnight and the caterpillars feed on the leaves and fruit until about midsummer when they drop to the ground and pupate in the soil. About two months later the moths emerge. In the spraying experiments the most valuable spray for Green Fruit-worm appeared to be that applied after the falling of the blossoms, the usual codling moth spray. Clean cultivation and destruction of rubbish is also an important factor in controlling this pest. The spraying experiments and observations are being continued during the coming season.

There is no doubt that when it is realized how the production and the proportion of high grade fruit may be increased, that systematic spraying along the lines of Mr. Sander's results will be more generally carried out, and for this reason the demonstration work he is doing will prove of inestimable value to the fruit-growers of the province. Already there are signs of a greater inclination and desire not only to spray but to spray systematically and with knowledge of the objects of spraying.

The Curculios of Plum and Apple in Quebec.

At Covey Hill,. Que., Mr. C. E. Petch continued his studies of the Plum Curculio (*Conotrachelus nenuphar*) and the Apple Curculio (*Anthonomus quadrigibbus*) which were commended in 1912. The complete failure of the fruit crop in the district severely handicapped the work. In the orchards in which the work was being carried on, 1,800 trees produced only a peck of apples, and very few plums were gathered from 200 trees. Nevertheless, progress was made in a study of the life-histories of these species, susceptibilities of varieties to attack and control measures.

Apple Maggot in Ontario.

A third season's work on the Apple Maggot (*Rhagoletis pomonella*) was carried on by Mr. W. A. Ross. The insect was remarkably scarce, however, and in orchards which had been previously badly infested, considerable difficulty was experienced in securing adults. Most of the work was carried on at Bowmanville, Ont. In addition to further studies on the life-history and habits of the insect the experiments on control measures were continued. These included the testing of a number of soil insecticides, cultivation, the use of poultry, and spraying with sweetened arsenicals. It was found that the insect may remain in the soil in the pupal stage for two years. In July, 1913, flies emerged from 1911 pupæ. Healthy 1912 pupæ were found which will no doubt emerge in the coming season (1914).

Mr. Ross commenced a study of the Aphides affecting fruit in western Ontario where the aphids on apple are particularly injurious to the foilage of young nursery stock and to young apples. The four commonest species on apple are the Apple Aphis (*A. pomi*); the Grain Aphis [*Hydaphis* (*Siphocoryne*) *avenæ*]; the Rosy Apple Aphis (*A. sorbi*); and the Woolly Apple Aphis (*Schizoneura lanigera*). The Green Peach Aphis (*Myzus persicae*) was particularly abundant in the fall of 1913.

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SESSIONAL PAPER No. 16

FRUIT INSECT INVESTIGATIONS IN BRITISH COLUMBIA.

Mr. R. C. Treherne concluded his study on the Strawberry Root Weevil (*Otiorhynchus ovatus*) commenced in 1912, and a bulletin on the subject is now in the press. Mr. Treherne's investigations have shown that the control of the Weevil is dependent upon cultural methods and the system of cropping.

In addition to making observations on miscellaneous insects affecting fruit, Mr. Treherne commenced a study of the Bulmoth (probably *Tmetocera ocellana*), in the Lower Fraser valley, where this species affects both nursery stock and the flower-buds of older apple trees.

IV. INSECTS AFFECTING FOREST AND SHADE TREES.

FOREST INSECT INVESTIGATIONS IN BRITISH COLUMBIA.

As frequent reports of serious forest insect depredations in British Columbia had been received during the last few years, and in view of the high commercial value of the merchantable timber in the province, it had been decided that Mr. J. M. Swaine, Assistant Entomologist in charge of Forest Insect Investigations, should make a preliminary survey of the forest insect conditions in 1913. A request from the Minister of Lands of British Columbia that such an investigation should take place was received and coincided with our own wishes. Accordingly, we were able to arrange for the work to be carried out in co-operation with the Provincial Forestry Branch, which contributed to the investigation by defraying Mr. Swaine's expenses while in the province. The investigation was confined to regions in the southern portion of the province and Vancouver Island. It was found that an immense amount of valuable timber is being destroyed by various injurious insects. Several outbreaks of Bark-beetles were located and studied, and reports were received of extensive Bark-beetle outbreaks in spruce and pine in regions which could not then be visited.

The most extensive injury examined during this summer's work was to bull pine by the Western Pine Bark-beetle (*Dendroctonus brevicomis*) and the Western White Pine Bark-beetle (*D. monticolæ*); and to Western White pine by the Western White Pine Bark-beetle. Many hundreds of trees have been killed by these beetles, and the infestations are still spreading. The Douglas Fir Bark-beetle (*D. pseudotsugæ*) was found killing Douglas fir both in the interior and on Vancouver island. The Sitka Spruce Bark-beetle (*Dendroctonus obesus*) was found killing the Sitka spruce on Vancouver Island. The Engelmann's spruce and lodgepole pine were also suffering severely in the Kootenays from Bark-beetle attack.

The practical results of this preliminary survey and suggested control measures are embodied in a bulletin now in the press.

The destructive bark-beetles are the most serious enemies of British Columbia forests. They can be controlled, fortunately, by modification of lumbering methods, which often involve little expense if applied during the earlier stages of the infestation.

In addition to the foregoing work, Mr. Swaine investigated the cause of the dying timber in Stanley Park, Vancouver, B.C., with a view to advising the Parks Board who are naturally alarmed at the destruction of the trees in this fine park of virgin forest. It was found that the Sitka Spruce Gall Aphis (*Chermes* sp.) and the Western Hemlock Looper (*Therina* sp.) have caused the death of a number of large trees in the park and in the environs of Vancouver. It is hoped that the investigations which we have commenced on these insects will result in checking this most unfortunate destruction. It is proposed to have a field officer stationed in Stanley park during the coming season to make a complete study of the insects responsible for the damage.

OTTAWA.

MISCELLANEOUS FOREST AND SHADE TREE INSECTS.

THE FOREST TENT CATERPILLAR (*Malacosoma disstria*) again defoliated large areas of poplar, birch, maple, and other deciduous trees, in parts of Eastern Canada, particularly in Quebec and New Brunswick, and in the Fraser River valley of British Columbia. A bacterial disease destroyed large numbers of the caterpillars in eastern Ontario last summer, and is expected to play an important part in their control, which is being studied by Mr. Tothill in New Brunswick. A circular on the Tent Caterpillars was published.

THE LARCH SAWFLY (*Nematus erichsonii*) is travelling steadily westward across Manitoba and northern Saskatchewan. It has already killed large numbers of larches in Manitoba forests. A further importation of parasitized cocoons of this sawfly was made from Great Britain, the cocoons having been collected at Ambleside, in the English Lake district. The cocoons were all placed in a tamarack swamp near Aweme, in southern Manitoba. In a check lot of the cocoons retained at Ottawa, it was found that 68 per cent were parasitized with *Mesoleius tenthredinis*, *Hypamblys albopictus*, *Microcryptus labralis*, and certain Tachinid parasites.

THE SPRUCE BUD-WORM (*Harmologa fumiferana*) has been reported from Ontario and Quebec woods less frequently than in the previous three years. It is apparent that its parasites have obtained control in many places and have saved the trees from further injury. An extensive outbreak appears to be spreading in the New Brunswick forests.

For several years the Eastern Fir Bark-beetle (*Ips balsameus*) has killed a large number of isolated balsam firs in Ontario, Quebec, and New Brunswick forests.

The Elm Bark-louse (*Gossyparia spuria*) is still a serious enemy to elms in Quebec and Ontario. Badly infested trees become unthrifty and gradually die. The Locust Borer (*Cyllene robiniae*) is killing locust and acacia trees in parts of Ontario. The larvæ excavate tunnels through the wood of living trees and prove a most destructive enemy. The Oak-twig Pruner (*Elaphidion villosum*) has been reported in injurious numbers in southern Quebec. The infested twigs die and fall to the ground; and when the insects are very numerous the appearance of the trees is considerably affected. The Bronze Birch-borer (*Agrilus anxius*) continues to be the most serious enemy of ornamental birches in eastern Ontario. The Poplar Borer (*Saperda calcarata*) has been very injurious to poplar shade trees.

V.—INSECTS AFFECTING DOMESTIC ANIMALS AND MAN.

THE CONTROL OF HOUSE FLIES.

The campaign against the house fly has been continued with unremitting zeal, and throughout Canada health authorities are convinced of the danger to health involved in the presence of flies. The requests for our circular on "How to deal with the Fly Nuisance" from medical officers of health and teachers are numerous and encouraging.

While the control of flies under city conditions is important and necessary in the interests of health, the control of flies under rural conditions is also very important, especially on account of its intimate connection with the problem of pure milk. The treatment of stable manure which constitutes the chief breeding place of the house fly is a serious question from the point of view of the farmer. Accordingly, a series of experiments were carried out in August and September, 1913, with a view to discovering an insecticide which is not only cheap and efficient, but does not decrease the fertilizing properties of the manure. A cubic yard of manure was used as a standard

and the number of flies emerging from each heap of manure treated or untreated was counted. A full description of the experiments has been published (*Journ. Economic Entomloogy, vol. 7, pp. 281-289*). The results were as follows:—

Treatment.	Number of flies emerged from manure.
Untreated	13,332
Zenoleum	8,042
Iron sulphate	7,850
Chloride of lime (surface application)	5,943
Chloride of lime (mixed)	4,627
Kerosene emulsion	3,481

While kerosene emulsion appeared to give the best results, this may have been due to the greater amount of straw in the experiment and I should prefer the chloride of lime. The treated manure will be tested during the coming season in regard to its fertilizing properties.

It may be added that a similar series of experiments was carried out by the Bureau of Entomology of the United States Department of Agriculture. Their experiments conclusively demonstrated the superiority of borax (crude sodium borate) or colemanite (calcium borate) over all other larvicides. This chemical was not tried in our experiments at Ottawa. It was found that 0·62 pound of borax was sufficient to kill all the larvæ in 10 cubic feet (8 bushels of manure); the dry borax is sprinkled on the manure and washed in with 2 or 3 gallons of water.

Treatment of Insect-infested Flour Mills.

In many parts of Ontario the Mediterranean Flour Moth (*Ephestia kuehniella*) is responsible for heavy losses in flour and feed mills. Mr. Ross carried on experiments on superheating as a method of ridding mills or stores of these insects in preference to fumigation. A mill in Dundas, Ont., in which the meal and flour was found to be alive with the caterpillars, and the moths were flying around in the bins, was selected. It was found that a temperature of 120° F., maintained for at least ten hours, would prove fatal to all eggs, caterpillars, and adults of *Ephestia*.

Miscellaneous.

Our inquiries in regard to the distribution of ticks in British Columbia, and especially of *Dermacentor venustus* on account of its relation to the obscure disease termed "tick paralysis" in children, have been continued, and additional data have been secured.

Following the discovery by Dr. S. Hadwen of the occurrence of the Warble Fly, *Hypoderma bovis*, in Canada in addition to *H. lineata*, which had always been regarded as the common North American species, our studies of the Canadian warble flies have been continued, and it has been found that *Hypoderma bovis* is commonly distributed throughout Canada, in some parts of which warble flies appear to be increasing in number; their control, therefore, demands careful attention, and especially is it necessary to secure co-operative effort among farmers in destroying the warbles in the spring.

VI.—INSECTS AFFECTING GARDEN AND GREENHOUSE.

As opportunities occurred, investigations on greenhouse insects have been carried on by Mr. Gibson at Ottawa, and by Mr. W. A. Ross in Toronto and other places in Ontario. Reference was made in my last report to the injuries of sowbugs. In greenhouses in London, Ont., they attacked the seedlings of sweet peas, *Asparagus*

plumosus, Primulas, petunias, and other plants; tender cuttings such as *Begonia* and *Coleus* were injured. Three species of these Isopods were found, namely, *Oniscus asellus, Armadillidum vulgare* and *A. quadrifrons*. Mr. Ross has discovered an effective poisoned bait, and finds that one of the most important preventive measures is cleanliness and the cleaning away of rubbish around the greenhouses. The Bulb Mite (*Rhizoglyphus hyacinthi*) was found seriously damaging the bulbs of Easter lilies in London, Ont. At Eglinton the Cattleya Fly (*Isosoma orchidearum*) was found injuring orchids. In greenhouses, and especially in gardens, the Tarnished Plant-bug (*Lygus pratensis*) continues to be injurious in Ontario. It is notably destructive to asters and chrysanthemums; one Ontario florist estimated the season's loss on chrysanthemums at $2,000, and on asters at $500. The Chrysanthemum Fly (*Phytomyza chrysanthemi*) was injurious in Toronto greenhouses. Mr. Gibson discovered an interesting case of the Variegated Cutworm (*Peridroma saucia*) destroying carnations by eating out the interiors of the buds.

Garden asters in different localities, including Ottawa, have been attacked and in many cases destroyed by root aphids (*Aphis maidi-radicis*), which are cultivated by ants. The occurrence of root-maggots has been mentioned in a previous section.

VII.—APICULTURE.

Apicultural Work at Ottawa.

On November 8, 1912, thirty-five colonies in the apiary were weighed and put into the bee cellar under the farm foreman's house. Their weights varied from 37 pounds to 66 pounds, average 52½ pounds. Average temperature of the cellar in November 49° F.; in December, 45° F.; in January, 42½° F.; in February, 43½° F.; in March, 47½° F.; in April, 48¼° F. The bees were brought out of the cellar and weighed on April 9. The loss in weight during the winter varied from 7 to 29 pounds per colony, average 15¼ pounds. Four colonies died in the cellar, one shortly before March 15, the others shortly before April 5. All were foodless, and starvation was the immediate cause of death. Their weights were as follows:—

Size of Hive.	Weight Nov. 8.	Weight after death April 5.	Loss.
	Lb.	Lb.	Lb.
8-frame	37	24	13
8-frame	47	28	19
10-frame	56	27	29
10-frame	58	29	29

Twelve colonies were wintered out of doors in special wintering cases. These cases were each made to hold four hives, with a space of 2 inches to 3 inches of packing material around the sides and underneath, and 10 inches on top, with a 2 inch air space above, ventilated by holes under the cover. The entrances were 9 inches long and 1½ inches deep, the lengths being reduced during winter by means of a strip of wood revolving on a screw. One of these cases was packed with clover chaff, another with cut straw and the third with shavings. As colonies wintered out-of-doors consume more food than those wintered indoors, extra heavy colonies were selected to place in these cases. All survived the winter which, however, was unusually mild. Loss due to bees dying in the snow was not serious. The colonies in the case packed

with shavings came out stronger than those in other cases. The case containing shavings was, however, slightly better protected from wind. In April, each of the twelve colonies had an average of about 10 pounds of stores. In the middle of April breeding was in a more advanced stage than in the colonies wintered in the cellar, and two of the colonies in the case packed with shavings were the strongest in the apiary. The bees were left in the wintering cases until the beginning of June, and during April and early May increased faster than the unprotected colonies that had been taken from the cellar. One of the colonies in the case packed with shavings swarmed on May 26. Several weak colonies that were found to be queenless or to contain unsatisfactory queens were united to others, the total number being thus reduced from 43 to 39.

The bees made a good start during April and the first six days of May, collecting nectar from willows and maples. From May 7 till May 30 the weather was cool and often cloudy and dry. Dandelion and fruit bloom yielded very little food, and breeding received a check from the 13th to the 20th.

Towards the end of May, widespread preparations for swarming, which could only be attributed to the abundance of the melliferous shrubs and trees in bloom on the farm, combined with uncertain weather for gathering, were made, and on May 27 about 80 per cent of the colonies were found to have queen-cells containing eggs and larvæ. The swarming fever was checked when, the weather improving, the bees discovered that little nectar could be got. June was a warm and fine month. The first flowers of alsike and white clover were seen on June 6. Unfortunately, a severe drought dried up these plants which are the chief source of honey in this region, and reduced their yield to a fraction of the usual quantity. A serious deficiency of rain continued until August 22. However, the weather for gathering was, on the whole, excellent, and for a period of seventy-six days, from the opening of the clover flow on June 24 until frost cut off the supply from aster and golden rod on September 8, the hives on scales gained steadily in weight.

Summary of gain in weight of a moderately strong colony, compiled from daily readings obtained from hives on scales:—

Period.	Gain during period.	Average gain per day.	Source.
June 25-30	14 pounds	About 3 pounds.	Mainly alsike and white clover.
July 1-31	32 pound.	" 1 pound.	" " white clover and sweet clover.
Aug. 1-30	17 "	" ½ "	" buckwheat and sweet clover.
Sept. 1-8	7 "	" 1 "	Aster and golden rod.
	70		

The above figures are necessarily only approximate, for the records were influenced by several varying factors which it was impossible to control.

The total honey crop for 1913 was 1,965 pounds of extracted honey, of which 695 pounds were graded white honey and 1,270 pounds amber or dark honey, and 533 sections, of which 233 were white and 300 amber or dark honey. The average yield per hive from 43 colonies spring count, was therefore 70½ pounds, reckoning, as is usually done, a section as equivalent to two pounds of extracted honey. The largest amount of honey taken from a single colony was 163 pounds of extracted honey. This colony consisted of evenly-marked three-banded bees, too excitable to be regarded as pure Italians in the strict sense.

The number of colonies was increased during the year from thirty-nine to fifty-three. The bees in the apiary, with the exception of four colonies of Pure Italians,

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containing queens obtained last year from Bologna, Italy, were three-banded and Golden Italians, crossed more or less with Blacks. Eight of the queens produced small proportions of black bees. The queens imported from Italy gave somewhat disappointing results, which may have been due in some measure to injury caused by the long journey.

European Foul Brood reappeared in several colonies on May 23. Between that date and the end of July diseased larvæ were observed in sixteen out of the original thirty-nine colonies. The six worst cases, in which more than about 100 larvæ were seen to be affected, were treated by the well-known method of shaking the bees into a clean hive, the combs being boiled down. Every colony that manifested definite disease was re-queened with a selected Italian. July brought a reduction in the number of affected larvæ, and in August only very few could be found.

European Foul Brood Summary.

	Extensively diseased.	Slightly diseased.	Remained Healthy.
Colonies consisting entirely of bees showing yellow bands often of varying widths, not including Italians from Italy or pure Goldens	3	6	17
Colonies in which bees showing yellow bands were mixed with black bees	3	1	4
Italians (from Italy)	1	1	2
Pure Goldens (queen obtained from Texas)	1		

The testing of different strains of Italians and hybrids for resistance to European Foul Brood was begun by Mr. Sladen, Assistant Entomologist in charge of Apiculture, and many queens of selected parentage were reared. A temporary bee-mating station was established on the Kazabazua plains, about 50 miles north of Ottawa. Although no colonies of bees could be discovered within 3 miles of this station, the Italian queens brought there were mated by local black drones, and the colour of the resulting hybrids was found to be, as expected, darker than that of pure Italians.

Queens of several varieties and strains of Italians and two pure Carniolan queens were obtained from Europe and introduced.

In September, all weak colonies were united, only selected queens of choice parentage being saved, and the bees were fed with sugar syrup to bring up the weight of the eight-frame colonies to about 60 pounds and the ten-frame colonies to about 70 pounds. The work of uniting and feeding was begun on September 18, and completed, with the exception of a few details, by October 1. On October 29, 30, and 31, sixteen colonies were weighed and packed in shavings in wintering cases for out-door wintering. Three of these cases were situated in a portion of the apiary that has been surrounded with a board fence 6 to 7 feet high to protect them from wind.

On November 10 the remaining thirty-seven colonies were weighed and placed in the bee cellar.

At the time of writing, March 28, all the colonies out-of-doors and indoors, seem to be wintering satisfactorily.

Mr. J. I. Beaulne rendered valuable assistance in the Apiary.

Apicultural Work on the Branch Farms.

During the past year steps were taken to organize the apicultural work on the Experimental Farms. In some cases apiaries already existed, in others bees were purchased and apiaries were started.

The following is a summary of reports of apicultural work that have been received from the branch Farms.

Ottawa.

Charlottetown, P.E.I.—Two colonies of Italians and three colonies of Black bees were purchased early in the season, and produced 75 pounds of surplus honey. The bees were placed in a room in the cellar of the Superintendent's residence on December 18. The temperature of the bee cellar was kept as near to 45° F. as possible. All the colonies came out in good condition in the spring of 1914.

Kentville, N.S.—Five colonies of Black bees were purchased locally early in July. They were so badly damaged in transit that only four weak colonies resulted. About 30 pounds of honey was extracted. A wintering case was made for each colony and the colonies were placed in these, packed in planer shavings on December 13.

Nappan, N.S.—From ten colonies, spring count, were obtained 1,170 pounds of extracted honey, valued at $140.40, 80 pounds of comb honey, valued at $20, and nine swarms, valued at $72. The greatest yield of extracted honey from a single colony was 205 pounds. White clover and Alsike clover are the principle nectar-yielding plants. Unfortunately, the bees went into the cellar a little short of stores and mice got into the hives, with the result that several colonies were found to be dead in the spring.

Ste. Anne de la Pocatière, Que.—Six colonies were purchased and arrived on June 28. They produced 208 pounds of honey and eight swarms.

Cap Rouge, Que.—The apiary was established on June 20 with ten colonies of Black bees. The yield of honey amounted to 267 pounds of extracted honey and 52 sections. The honey flow from White clover, the chief honey plant, was of short duration, and interrupted by frequent rainy days. Eleven colonies were wintered in the cellar under the superintendent's house, and seem to be in good condition.

Brandon, Man.—Eight colonies gathered an average of 30¼ pounds of honey each and gave twelve swarms. The best colony gathered 68 pounds of honey and threw two swarms on July 4 and 14. Twenty colonies were placed in the basement of the Superintendent's residence on November 10.

Indian Head, Sask.—A fresh start with bees was made in June with two small swarms. These were shipped from Ottawa, a distance of over 1,600 miles, in "combless" wire cages, provided with water and candy. Both colonies swarmed, and an attempt made to winter the four weak and poorly provisioned colonies ended in the loss of two, and the reduction of the others to extreme weakness.

Lacombe, Alta.—Two colonies came through the winter satisfactorily and swarmed during the summer of 1913, but the swarms were lost. These colonies were wintered in a root cellar which proved too damp, causing death of both colonies.

Invermere, B.C.—Six colonies obtained from Salmon Arm in June produced an average of about 40 pounds each of excellent honey, for which there was a ready local demand.

Agassiz, B.C.—In the autumn of 1913, 13 pounds of mixed honey were extracted. In the spring of 1914 there were eight colonies in good condition. Two died, probably from starvation, during the winter, which, though comparatively mild, was very wet. The hives in use are of the Langstroth ten-frame pattern.

Sidney, B.C.—Ten colonies of bees were purchased from a neighbouring bee-keeper in the autumn of 1913, and were removed to the Farm in the early spring. This is a good region for honey production and good results are hoped for.

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VIII.—MISCELLANEOUS.

Collections.

The collection of insects which now constitutes the National Collection has increased materially during the past year owing to the increase in the staff of the Division, and the greater opportunities which are now afforded to secure insects of all orders by the presence of field officers in the various provinces. Mr. Germain Beaulieu has worked most zealously in dealing with new material and in arranging the collections generally, excellent progress having been made in the arrangement of the Coleoptera. We have continued to name collections of insects for individuals and teaching institutions.

In the determination of new material we have again enjoyed the assistance of Dr. L. O. Howard, Chief of the United States Bureau of Entomology, and his scientific assistants in the Bureau and in the National Museum at Washington, for which assistance we are most grateful, and we would also express our gratitude and indebtedness to other specialists who have assisted us during the year.

An exhibition of injurious and useful insects was made at the Central Canada Exhibition held at Ottawa in September last.

Protection of Birds.

As the protection of insectivorous birds has a very direct bearing on the natural control of insect pests, and as such birds are both thoughtlessly and wantonly destroyed in Canada, thereby reducing the numbers of our allies in the control of insect pests, every effort is being made to impress upon farmers, teachers, and others, the importance of protecting our native birds. A proposal which I made to the Ottawa Field Naturalists' Club for the institution of a practical example of bird protection in Ottawa has been adopted and will be put into effect during the coming spring. The Ottawa Improvement Commission have agreed to constitute Rockliffe Park a bird sanctuary and to make and distribute 250 nesting boxes of the Berlepsch pattern in the park. On our part, you have kindly agreed to have 160 Berlepsch nesting boxes distributed on the grounds and in the Botanical Gardens of the Central Experimental Farm. We hope that this will prove a valuable example of the methods to be taken to attract birds to the farm.

Correspondence.

The growth of the work has naturally resulted in an increase in the correspondence. The number of letters received from April 1, 1913, to March 31, 1914, was 6,384, and the number of letters sent out during the same period was 7,814, compared with 5,105 letters received and 6,938 letters sent out during the previous fiscal year.

Travelling.

The direction and supervision of the work has necessitated, as usual, visits to the different provinces during the year. All the fumigation stations have been visited. In June and July a visit was made to New Brunswick, Nova Scotia and Massachusetts. The Fiftieth Annual Meeting of the Entomological Society of Ontario was held at Guelph, Ont., in August, and was attended by all the members of the scientific staff who were able to be present. On September 8, I left Ottawa to visit the field laboratories in Ontario and Western Canada. In British Columbia I also visited a number of the Indian reserves in order to inspect the progress of our work in the orchards of the Indians which is being carried on by Mr. Tom Wilson. I left Victoria, B.C., on October 11 for the United States; the Oregon Agricultural College, Corvallis, Ore. was visited on the way to California, where I wished to examine their quarantine

methods, etc., and to inquire into the occurrence of the Potato Tuber Moth (*Phthorimæa operculella* Zett.). The Universities of California and Leland Stanford were also visited. On the return journey two days were spent at Salt Lake City, Utah, for the purpose of looking into the question of the Alfalfa Weevil (*Phytonomus murinus* Fab.). From December 30 to January 2 the meetings of the American Association for the Advancement of Science, the Entomological Society of America and the Association of Economic Entomologists were attended at Atlanta, Ga. The various officers of the Division have attended meetings throughout the year for the purpose of giving addresses and demonstrations.

Publications.

During the year the officers of the Division, both at headquarters and in the field, have contributed scientific papers to entomological and other journals, embodying results of too technical character for publication in bulletin form. More popular articles on the control of various insect pests have been contributed from time to time to agricultural journals and papers.

In addition to two bulletins which have been prepared and are now in the press, the following circulars have been published during the year:—

"Tent Caterpillars," by J. M. Swaine, 14 pp., 8 figs. (*Entomological Circular No. 1.*)

"Flea-beetles and their Control," by Arthur Gibson, 12 pp., 14 figs. (*Entomological Circular No. 2.*)

"The Chinch Bug in Ontario," by H. F. Hudson, 13 pp., 3 figs. (*Entomological Circular No. 3.*)

Staff.

With the increase in our work, and its expansion in various directions, an increase in the staff of the Division has been necessary, and the following officers have been appointed during the past year:—

Mr. L. S. McLaine, M. Sc., was appointed a field officer in April, 1913. He graduated at the Massachusetts Agricultural College, Amherst, Mass., in 1910, and received his master's degree in 1912 for research in entomology. Prior to his appointment Mr. McLaine was acting as Deputy State Nursery Inspector of Massachusetts, and he has therefore had excellent experience in field work in addition to a thorough laboratory training. During the summer of 1913 he was responsible for the work of securing parasites of the Brown-tail and Gipsy Moths in Massachusetts, and throughout the past winter he has had charge of the field work against the Brown-tail Moth in New Brunswick.

Mr. A. E. Kellett was appointed an Artist Assistant in August, 1913. Mr. Kellett studied art for three years in the Armstrong Academy of Arts, Newcastle-on-Tyne, England, and subsequently he served five years' apprenticeship to process engraving and illustrating. He has, therefore, had an excellent training both in the artistic and technical aspects of illustrating work. After coming to Canada in 1910 Mr. Kellett was employed in Winnipeg as artist and designer.

Mr. Joseph Perrin was appointed inspector of imported nursery stock at Halifax, N.S. Mr. Perrin has always been a keen entomologist, and has added materially to the knowledge of the lepidoptera of Nova Scotia.

The progress and success of our work has been due to the zealous and enthusiastic manner in which all the officers of the Division, both at headquarters and in the field, have carried on their work, of which I cannot sufficiently express my appreciation. My especial thanks and acknowledgments are due to my Chief Assistant, Mr.

Arthur Gibson, who has had charge of the work during my absence. Grateful acknowledgment is also due to the conscientious and satisfactory manner in which the clerical duties have been carried on by Miss J. McInnes, Messrs. J. A. Letourneau and M. J. Moloughney, with temporary assistance. It is now felt that we are in a better position to render the assistance which is desired by the agriculturists, foresters, and others who suffer from the depredations of insect pests, and that the lines upon which the work is being developed are such as to bring us more directly and readily into contact with those whom it is our privilege to assist in developing the resources of the country.

I have the honour to be, sir,
Your obedient servant.

C. GORDON HEWITT.
Dominion Entomologist.

Ottawa.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF FORAGE PLANTS

For the Year ending March 31, 1914

PREPARED BY

The Dominion Agrostologist, Central Farm, Ottawa. - - -	M. O. Malte, Ph.D.
Superintendent—	
Experimental Station, Charlottetown, P.E.I. - - - -	J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S. - - - - - - - -	W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S. - - - - - - -	W. Saxby Blair.
Experimental Station, Fredericton, N.B. - - - - - -	W. W. Hubbard.
Experimental Station, Ste. Anne de la Pocatière, Que. -	Joseph Bégin.
Experimental Station, Cap Rouge, Que. - - - - - -	G. A. Langelier.
Experimental Farm, Brandon, Man. - - - - - - - -	W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask. - - - - - -	T. J. Harrison, B.S.A.
Experimental Station, Rosthern, Sask. - - - - - - -	Wm. A. Munro, B.A., B.S.A.
Experimental Station, Scott, Sask. - - - - - - - -	R. E. Everest, B.S.A.
Experimental Station, Lethbridge, Alta. - - - - - -	W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta. - - - - - - -	G. H. Hutton, B.S.A.
Experimental Farm, Agassiz, Alta. - - - - - - - -	P. H. Moore, B.S.A.
Experimentalist, Substation at Fort Vermilion, Alta. - - -	Robert Jones.

REPORT FROM THE DIVISION OF FORAGE PLANTS.

OTTAWA, March 31, 1914.

J. H. GRISDALE, B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the second annual report of the Division of Forage Plants for the year ending March 31, 1914.

The work of this Division is now well under way, and in this and succeeding reports I trust that the information contained will prove of considerable value to farmers and agriculturists throughout the Dominion.

In addition to the breeding work started in 1912, with clovers, alfalfa, and grasses at the Central Experimental Farm, Ottawa, a mass selection system for the production of hardy strains of clover has been started both at the Central Experimental Farm and at several of the branch Farms.

A start has also been made in systematic root breeding, by the selection of a large number of seed roots from the highest yielding varieties of mangels, turnips, and field carrots.

During the year, Mr. F. S. Browne, B.S.A., who in 1912 acted as foreman of this Division, has been promoted to the position of assistant, and the position of foreman vacated by him has been taken by Mr. George Goodfellow, a position he has filled in the past year in a faithful and competent manner.

I have the honour to be, sir,

Your obedient servant,

M. O. MALTE,
Dominion Agrostologist.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION AGROSTOLOGIST—M. O. MALTE, Ph.D.

VARIETY TESTS.—INDIAN CORN AND FIELD ROOTS.

PREPARATION OF SOIL.

In the fall of 1912 the land for roots and corn was manured at the rate of about 15 tons to the acre, and ploughed. After ploughing it received a top dressing of lime at the rate of about 1 ton to the acre.

During the first week in May, 1913, the field was double disced, drag-harrowed, and rolled. The land for mangels, carrots, and sugar beets was then drilled and the drills raked down with a hand rake, after which the seed was sown with a Planet Jr. seeder on May 5.

The land for turnips was drilled and raked on May 18.

The corn was sown on the flat, the hills being spaced 3 feet each way.

THE DOUBLE PLOT SYSTEM.

Up to the year of 1913, each variety of Indian corn and field roots has been grown in a single plot and the comparative yielding power consequently calculated from the return from one plot only. By growing the same varieties during a long period of years, valuable conclusions have been arrived at regarding the relative value of certain varieties for certain districts.

This is especially true as regards the suitability of the varieties to the climatic conditions in a district. By studying the comparative yield of the different varieties during different seasons, characterized by varying amounts of rainfall, conclusions of value can be drawn as to the general suitability of different varieties to a certain district.

On the other hand, the experiments carried out so far have revealed the fact that the results obtained from them do not seem to be as conclusive as could be wished. In fact, certain inconsistencies in the results occur which often seem rather puzzling. Thus, a variety for instance which generally is high yielding may, one year, drop almost to the bottom of the list, while another which is notoriously low yielding may occupy first place on the comparative list.

Incidents of this kind might be due to the fact that the quality of the seed of the different varieties is widely different or the fact that the weather of the given season is decidedly more favourable to certain varieties.

In the majority of cases, however, irregularities of the kind referred to may be traced back to the unevenness of the soil in the experimental field. That the character of the soil must necessarily influence the yield needs no explanation. Now, if a number of varieties of, say, turnips are tested in single plots spread over a field uneven in character, it is evident that plots, *i.e.*, certain varieties, may be grown under more favourable soil conditions than others and consequently must give a higher yield. It is also evident that a comparison of varieties according to yields when grown under such conditions can hardly be relied upon.

In order then to eliminate, as far as possible, the disturbing influence of diverse soil conditions on the comparative yields of the varieties, each variety was this year

grown in two plots situated in different parts of the experimental field, and the yielding power of each variety calculated from the average yield of the two plots.

This method of duplicating the experiments has been introduced at the Central Experimental Farm as well as at those branch Farms and Stations where comparative tests are carried out.

Although, of course, it is not possible to ascertain the value of the double-plot system after only one year's experience, the indications are that the duplicating of the experiments gives much more satisfactory results than the single-plot system previously followed.

INDIAN CORN FOR ENSILAGE.—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Weight per Acre Grown in Hills.	
				Inches.		Tons.	Lb.
1	90 Days	May 27	Sept. 22	74	Early dough	15	800
2	Early Longfellow	" 27	" 22	86	Glazeing	14	300
3	Saltzer's North Dakota	" 27	" 22	90	"	14	200
4	White Cap Yellow Dent	" 27	" 22	97	Hard dough	15	200
5	Canada Yellow	" 27	" 22	60	Glazed (hard)	9	850
6	Comoton's Early	" 27	" 22	100	Hard dough	17	400
7	Windus Yellow Dent	" 27	" 22	90	Glazed	10	1,800
8	Thayer White Dent	" 27	" 22	90	Early dough	10	1,750
9	Wisconsin No. 7	June 15	" 22	98	"	16	700
10	Bailey	" 15	" 22	110	"	16	1,400
11	Golden Glow	" 15	" 22	96	"	17	1,600
	Average					14	727

TURNIPS.—Test of Varieties.—Yield per Acre.

No.	Variety.	1st Plot.				2nd Plot.				Average.			
		Tons	Lb.	Bush.	Lb.	Tons	Lb.	Bush.	Lb.	Tons	Lb.	Bush.	Lb.
1	Hall's Westbury	29	1,000	983	20	23	400	773	20	26	700	878	20
2	Magnum Bonum	26	800	880	..	24	1,500	825	..	25	1,150	852	30
3	Hartley's Bronze Top	26	1,500	891	40	29	400	973	20	27	1,950	932	30
4	Halewood's Bronze Top	24	1,300	821	40	26	1,700	895	..	25	1,500	858	20
5	Perfection	25	1,800	863	20	24	....	800	..	24	1,900	831	40
6	Good Luck	26	1,000	883	20	29	300	971	40	27	1,650	927	30
7	Jumbo	24	400	806	40	26	200	870	..	25	300	838	20
8	Mammoth Clyde	22	100	735	..	20	300	671	40	21	200	703	20
9	Bangholm	23	800	780	..	22	200	736	40	22	1,500	758	20
10	Lapland	24	900	815	..	26	1,700	895	..	25	1,300	855	..
11	Kangaroo	23	1,000	783	20	25	1,700	861	40	24	1,350	822	30
12	Skirvings	22	1,100	751	40	22	800	746	40	22	950	749	10
13	Best of all	27	....	900	..	24	900	815	..	25	1,450	857	30
14	Elephant	18	100	601	40	15	1,000	516	40	16	1,550	559	10
15	New Century	24	1,300	821	40	23	1,300	788	20	24	300	805	..
16	Hazard's Improved	24	1,300	821	40	24	1,000	816	40	24	1,150	819	10
17	Canadian Gem	24	1,400	823	20	26	400	873	20	25	900	848	20
18	Ostersundom	28	1,300	965	..	28	100	935	..	28	1,000	950	..
19	Stubb	19	1,900	665	..	23	800	780	..	21	1,350	722	30
		24	1,243	820	43	24	1,089	818	9	24	1,166	819	26

Seed sown May 18. Thinned to bunches of four or five on June 10. Singled out by hand to 9 inches apart June 18. Wheel hoed June 2, 24, and July 3. Horse cultivated June 16, July 10, August 1. Pulled October 30.

The crop was severely ravaged by the cabbage root maggot, making the crop somewhat uneven. In spite of the dry weather the crop made a good steady growth throughout the entire season. Owing to the previous application of lime to soil, no club-root was noticed.

MANGELS —Test of Varieties.—Yield per Acre.

No.	Variety.	1st Plot.				2nd Plot.				Average.			
		Tons.	Lb.	Bush.	Lb.	Tons.	Lb.	Bush.	Lb.	Tons.	Lb.	Bush.	Lb.
1	Giant Yellow Globe....	26	1,740	895	40	27	1,360	922	40	27	550	909	10
2	Selected Yellow Globe	20	1,250	687	30	24	250	804	10	22	750	745	50
3	Golden Tankard.....	17	1,800	596	40	18	1,100	618	20	18	450	607	30
4	Gate Post.....	22	900	748	20	22	600	743	20	22	750	745	50
5	Eckendorfer Red.....	18	1,200	620	..	19	100	635	..	18	1,650	627	30
6	Mammoth Long Red...	19	900	648	20	24	300	805	..	21	1,600	726	40
7	Perfection Mammoth Red.....	20	1,300	688	20	20	1,900	698	20	20	1,600	693	20
8	Giant Yellow Intermediate....	24	150	802	30	28	350	939	10	26	250	870	50
9	Mammoth Yellow Intermediate.....	20	1,900	698	20	23	1,900	798	20	22	900	748	20
10	Yellow Leviathan.. ..	26	1,700	895	..	24	1,900	831	40	25	1,800	863	20
11	Giant Half Sugar White	22	300	738	20	22	1,500	758	20	22	900	748	20
12	Prize Mammoth Long Red.....	20	1,700	695	..	21	1,600	726	40	21	650	710	50
13	Danish Sludstrup	22	100	735	..	24	1,400	823	20	23	750	779	10
	Average...	21	1,611	726	51	23	635	777	15	22	1,123	752	3

Seed sown May 5. Thinned to bunches of four or five, June 8. Singled by hand to 9 inches apart June 16. Wheel hoed May 30, and at the same dates as the turnips. Horse cultivated at the same dates as the turnips. Pulled October 15.

The crop made an excellent start, but owing to dry weather during July and August it was lighter than in previous years.

CARROTS.—Test of Varieties—Yield per acre.

No.	Variety.	1st Plot.				2nd Plot.				Average.			
		Tons	Lb.	Bush.	Lb.	Tons	Lb.	Bush	Lb.	Tons	Lb.	Bush.	Lb.
1	Ontario Champion.....	29	....	966	40	26	700	878	20	27	1,350	922	30
2	Half Long Chantenay..	20	1,200	686	40	16	1,000	550	..	18	1,100	618	20
3	Mammoth White Intermediate	27	....	900	..	25	....	833	20	26	....	866	40
4	Giant White Vosges....	23	1,700	795	..	20	....	666	40	21	1,850	730	50
5	White Belgian.....	27	....	900	..	25	600	843	20	26	300	871	40
6	Improved Short White.	27	....	900	..	27	....	900	..	27	....	900	.
	Average.....	25	1,483	858	3	23	717	778	37	24	1,100	818	20

Seed sown May 5. Thinned to bunches of four or five, June 10. Singled by hand to plants 4 inches apart, June 17. Cultivated and wheel hoed same dates as mangels. Pulled October 23.

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SUGAR BEETS.—Test of Varieties.—Yield per Acre.

No.	Variety.	1st Plot.				2nd Plot.				Average.			
		Tons	Lb.	Bush.	Lb	Tons	Lb.	Bush.	Lb.	Tons	Lb.	Bush.	Lb.
1	Vilmorin Improved 'B'.	14	900	481	40	17	600	576	40	15	1,750	529	10
2	Klein Wanzleben.....	14	200	470	..	17	300	571	40	15	1,250	520	50
3	Vilmorin Improved 'A'.	12	1,800	430	..	15	1,900	531	40	14	850	480	50
	Average	13	1,633	460	33	16	1,600	560	..	15	617	510	17

Same treatment as mangels, excepting that they were thinned to 7 inches apart and pulled October, 17.

Both sugar beets and carrots withstood the dry summer fairly well.

BREEDING WORK.

FIELD ROOTS.

As farmers realize that the introduction of mixed farming will materially add to the agricultural prosperity of the country, the problem of growing field roots as food for stock will be paid more attention to than at present. With a larger demand for field roots a higher standard will be demanded.

Realizing this, the Division of Forage Plants this year took preliminary steps toward the production of new varieties better adapted to Canadian conditions than those grown at present.

The apparent unevenness of many of the varieties now regarded as among the best in Canada, seems to indicate that by proper selection of types, new and more fixed varieties can be produced. There is also every indication that by such methods new varieties can be raised which, in addition to being more uniform as to type, also will prove superior to the variety from which they have been developed, as regards yielding power and feeding value.

With the view of producing new varieties having the characteristics just mentioned, a number of seed roots were selected from different varieties of turnips, mangels, and carrots as follows:—

Turnips—189 roots out of 10 varieties.
Mangels— 32 " " 4 "
Carrots— 32 " " 4 "

ALFALFA.

Value and drawbacks of Variegated Alfalfa.—For large areas of Canada where the winter and early spring conditions are unfavourable to growing of alfalfa the necessity of having particularly hardy varieties is evident. At present, so called "variegated" alfalfas have proven to meet, successfully, the demand for hardiness. Among the best known varieties of variegated alfalfas are Grimm's alfalfa and Ontario Variegated.

These varieties are especially suited to severe winter conditions for the reason that they originated as crossings between the ordinary alfalfa and the yellow lucernes (*Medicago falcata*). The latter species which, among other things, differs from ordinary alfalfa in having yellow flowers, is a northern species which occurs naturally in north-

ern Europe and northern Asia. Consequently it is naturally adapted to severe winters and is able to withstand, successfully, most adverse conditions. Now, the variegated alfalfas having inherited the cold resistant powers of yellow lucerne they are much hardier than ordinary alfalfa, and consequently better adapted to those parts of Canada where hardiness is essential.

On the other hand, it must not be forgotten that variegated alfalfas are somewhat inferior to ordinary alfalfa as regards yielding capacity and feeding value. This inferiority is due to the infusion of yellow lucerne which, is inferior to ordinary alfalfa in the respects just mentioned.

Yellow lucerne is generally rather prostrate in habit, often trailing flat on the ground. Its stems are more wiry in character and show a tendency to become rather woody. These characteristics which make the hay of the yellow lucerne coarse and unpalatable to stock, have been partially inherited by the variegated alfalfas. Consequently the latter varieties, including Grimm's alfalfa and Ontario variegated, are inferior in feeding value to ordinary alfalfa.

Breeding New Varieties.—Realizing this, the Division of Forage Plants has taken steps toward the production of new varieties, possessing the hardiness of variegated alfalfa and the feeding value of ordinary alfalfa.

There are two main roads leading to the production of new varieties, combining the above characters, viz.; breeding from variegated alfalfa and breeding from ordinary alfalfa.

Breeding from variegated alfalfa.—Being a cross between two species, variegated alfalfa is naturally not a uniform "variety," but consists of a mixture of a very great number of different forms in which the characters of ordinary alfalfa and yellow lucerne are combined in thousands of different ways. The practically unlimited number of forms which thus result from the crossing are all more or less different. Most of them, however, possess the hardiness of the yellow lucerne. But, on the other hand, they have also inherited, more or less markedly, such characters from the yellow lucerne as make the latter inferior to the ordinary alfalfa.

A few forms, however, can be singled out which have inherited the best characters from both of the parents, *i.e.*, hardiness from yellow lucerne and high yielding power and feeding value from ordinary alfalfa. From such forms the Division of Forage Plants is endeavouring to raise new varieties.

In order to secure such varieties of a known pedigree over one hundred crosses were made between flowers or ordinary alfalfa and yellow lucerne. The seed produced from those crossings will be used for the raising of new uniform varieties.

Breeding from ordinary alfalfa.—At present, there do not exist any pure uniform strains or varieties of alfalfa. Even such fields of ordinary alfalfa as seem to be fairly uniform as to general appearance, prove, upon closer examination, to be composed of a great number of different types. All so-called "varieties" are in reality mixtures of hundreds or even thousands of different types having more or less striking differentiating characters. These types differ not only in external characters, such as height, branching, number of stalks to the root, leafiness, colour of flower, etc., but also as to biological properties, such as hardiness, earliness, etc.

All these characters are hereditary, *i.e.*, they can be transmitted from a mother plant to its progeny.

The mere fact that, in ordinary alfalfa, there exist types having different ability to withstand severe winter conditions and that the different degrees of hardiness are hereditarily transmissible, makes it evident that, out of ordinary alfalfa, varieties possessing different degrees of hardiness can be produced.

Taken in bulk, ordinary alfalfa in many cases proves insufficiently hardy, which quality manifests itself in total or partial winter-killing of the same. Its hardiness

can, however, be greatly improved through a process of elimination of all non-hardy types and by using hardy types only for the production of seed.

The elimination of tender types takes place naturally every year in any field exposed to a severe winter. During this year, it was very marked in the alfalfa plots of the Division of Forage Plants, the percentage of the plants killed being in many cases very high.

The plants in the plots referred to which withstood the winter successfully may, however, be expected to represent hardy types and, the hardiness being an hereditary character, should prove most valuable. They can be expected to produce a progeny the average hardiness of which ought to be superior to that of the plots before the winter-killing took place.

Basing the work of breeding alfalfa for hardiness on this very reasonable supposition, all the plots except a few set aside for other purposes, were allowed to go to seed. In all, twenty-one lots of alfalfa seed were secured. This seed will be used for new plots, which, it may be safely predicted, will represent "varieties" of a much hardier nature than were the plots from which the seed was secured.

Thus, having secured an alfalfa stock, characterized by hardiness, the Division of Forage Plants can continue its efforts to improve the alfalfa by concentrating its breeding work on the production of heavy-yielding varieties from a hardy stock.

Having this, the second stage of the alfalfa breeding work, in mind, the Division has this year paid considerable attention to preliminary work aiming at the perfection of working methods to be employed in the final breeding of new hardy varieties of outstanding yielding capacity from individual plants.

Thus, during the year, extensive experiments have been carried out with a view of finding the best methods whereby seed of known and controlled pedigree can be most satisfactorily produced from individual plants of outstanding merits. These experiments, which consisted of a series of artificial fertilizations, both self-fertilization and cross-fertilization between flowers belonging to different plants, varied in many different ways, were most satisfactorily conducted by Mr. F. S. Browne, B.S.A., Assistant to the Dominion Agrostologist, and promise to be of great value for the breeding work which the Division is planning for coming years.

In order, also, to secure a stock of individual plants from which to select promising types as mother plants for new varieties, twenty-five lots of forty plants each, making a total of one thousand plants, were transplanted in the breeding field during July and August. In order to facilitate the study of the peculiar characteristics of each individual plant, the plants were arranged 3 feet apart each way.

The land used is heavy clay. On account of the very dry weather during August and September, the plants made a far from satisfactory growth. They therefore entered the winter in a rather poor condition.

CLOVER.

What has been said about the non-uniformity of alfalfa also applies to clover. There does not exist, in fact, any uniform variety of clover. All so-called "varieties" consist of a very great number of forms, differentiated not only as regards characteristics easily discernible to the eye, such as mode of growth, colouring and shape of leaves, etc., but also as regards properties which only by closer study can be revealed, such as hardiness and duration.

This ascertained, it is evident that the breeding principles, applied to alfalfa, also can be used to advantage with clover. In other words, clover can be improved both by mass-elimination of undesirable forms, particularly those that are lacking in hardiness, and by breeding from distinct individual plants having most desirable characters.

Breeding for increased hardiness.—In order to obtain, by natural selection of the hardiest types of clover, materially superior varieties, *i.e.*, varieties more able to with-

stand the hardships of the Canadian winters, experiments were started with nine lots of red clover and three lots of Alsike clover, obtained partly from seedsmen and partly from private growers.

Each lot of seed has been used for three plots, the object being to endeavour to prove by actual figures that by taking seed during a number of years from plots gradually freed, through a process of mass-elimination, from the least resistant types, clover varieties may be obtained characterized by greater hardiness and consequently having greater value.

One of the plots of each lot is set aside for hay production, and, from the figures obtained the comparative hay-yielding capacity of each lot will be calculated.

The second plot of each lot is intended for seed production, the seed to be used for further experiments, similar to those now started, during 1915.

The third plot of each variety consists of rows in which the plants were carefully counted during the fall of 1913. By recounting, in the spring of 1914, of the plants of each lot, the percentage of the killed-out plants of the lot can be accurately determined, and consequently accurate figures bearing upon the winter hardiness of each lot be obtained.

The experiment outlined above was started primarily with a view of demonstrating the possibility of securing, by natural mass-selection, varieties of clovers possessing greater hardiness than have the average clovers now available to Canadian farmers through seedsmen. Its planning was based upon the fact that, in many countries of Europe, and in a few districts of Canada, local strains of clover have been produced which prove far superior to any introduced variety.

Actual proofs to the effect that seed of clover, grown in certain districts, generally gives far better crops than seed imported from somewhere else, have so far not been available to the Department of Agriculture. The experiments now started by the Division of Forage Plants will provide, it is hoped, the proofs required. They will endeavour to prove, not only that the hardiness of clover can be generally improved upon, but also that, for a certain district, home-grown seed is preferable to seed grown in any other district.

With the latter object in view the experiments referred to have been started not only at the Central Experimental Farm, but also on most of the branch Farms and Stations throughout the Dominion.

Breeding for increased yield.—In breeding new varieties of clover the same policy has been pursued as indicated above for alfalfa, namely:—

1st. To secure a perfectly hardy stock.
2nd. To breed for increased yield from such a stock.

In order to obtain a larger and therefore more varied starting material of Red clover, individuals were planted this year to a number of about nine hundred. The seed had been secured from plants growing in the experimental field and on the Farm in 1912, and can therefore be expected to prove fairly hardy.

GRASSES.

Timothy.—During 1912, about twelve hundred individual plants, selected from wild Canadian material, were transplanted in the field for further observations. These plants made a very fine growth last year, amply illustrating the fact that timothy is a very complex species, composed of hundreds of different types of a very different agricultural value. The fact that, in many cases, plants originating from the same mother plant showed a remarkable uniformity as to general appearance.

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served furthermore to strengthen the opinion, expressed in previous reports, that it will be possible to obtain, within a comparatively short time, new, fairly uniform strains of this very prominent fodder grass. Judging from this year's experience it seems very likely to be possible to produce strains having a yielding capacity at least 25 per cent greater than the best timothy now obtainable commercially.

From the plants sown 1912, seventeen individuals showing desirable characters were selected, isolated and self-fertilized. They all produced a fair quantity of seed. This will be sown next year, and the plants originating therefrom tested for uniformity and other characters which may make them worthy of further investigations.

In order to obtain still more material for breeding work, about twenty-four hundred individuals raised from seed secured chiefly from Western Canada, were transplanted during the summer. In spite of the drought, they made a very satisfactory growth and entered the winter in a splendid condition.

Orchard Grass.—Breeding work, similar to that with timothy, was also started with Orchard grass, although on a much smaller scale. A total of a little more than two hundred individuals were planted in the field during 1912. These plants, which this year made a surprisingly fine growth, demonstrated in a still higher degree than did timothy, that the morphological characters of the different types existing within Orchard grass are hereditarily transmissible, and that the production of uniform new strains of high quality will be a comparatively easy task.

From among the two hundred plants, ten of the most outstanding were selected, isolated and self-fertilized. They all produced a fair quantity of excellent seed.

In addition to the material, sown in 1912, about one hundred individuals were secured this year from seed raised at the Central Experimental Farm and in Siberia. Although the growth of these plants was very slight, they all appeared to be healthy and strong.

Western Rye Grass.—Observations to the effect that Western Rye grass also is a very polymorphous plant, from which uniform strains may easily be isolated, were made on specimens shipped from Saskatchewan during the summer of 1912, and transplanted at the Central Experimental Farm. Seed was secured for further study from two of the most promising of these plants.

Wild Grasses.—With a view of securing, gradually, a fairly complete collection of Canadian wild grasses and sedges, growing at the Central Experimental Farm and illustrating, in a popular way, the properties and relative values of the native fodder and pasture plants, seed was collected from a fairly representative number of species during 1912. Part of this seed was sown this year in pots, and the plants thus obtained transplanted in small squares. An additional number of grasses and sedges, collected in the vicinity of Ottawa chiefly during the spring of 1913, were also transplanted in the same way. Owing, however, to the severe drought, some of the species succumbed or entered the winter in a rather weak condition.

HERBARIUM.

During the past year, several hundred specimens of Canadian grasses and sedges were added to the collections started in 1912. Among these are quite a few systematically critical species, for the clear understanding of which special research work is needed.

The similarity existing between the Canadian grass flora and the grass flora of northern Europe, and furthermore the fact that every year European grass is introduced into Canada, makes a comparative study of the grass flora mentioned an urgent necessity. In other words, for the proper understanding of a great number of Canadian grasses and sedges, European material for comparison is necessary.

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In order to obtain such material at the least expense, arrangements have been made with the Botanic Garden, Lund, Sweden, to secure, through exchange, a representative and complete collection of grasses and sedges from Sweden, Norway, Finland, and Denmark. In accordance with this arrangement, a collection of duplicate plants, numbering about one thousand sheets and representing over three hundred Canadian species have been sent for exchange, and the receipt duly acknowledged.

BROOM CORN.

Three varieties of Broom corn were used for experiments endeavouring to prove the influence of early and of late sowing on the yield and the quality of the brush. The results of this experiment indicate that early seeding is distinctly preferable to late, and that even a week's difference in seeding will affect the yields considerably. As far as our experience goes, Broom corn should be sown about the same time as Indian corn.

OTTAWA.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARKE, B.S.A.

CHARACTER OF SEASON.

Frost entered the ground to a great depth during the winter of 1912-13 owing to the severe cold while the ground was bare of snow. The snow lay on the ground very little more than one month during the year, from the middle of February to the middle of March. The month of March was noted for its sudden changes, which caused great freshets. These caused a considerable washing of the land and in many places much injury was done to even the level fields by the water cutting great trenches in unlooked-for places. The warm weather of April brought the grass and trees forward nearly two weeks ahead of the season of 1912. May and June were dull and cool. The grasses, clovers, and roots came on slowly, yet they made good growth. Corn came up, then remained almost stationary until the end of June. The frequent showers and the moderate temperatures of July were very favourable to the root crop. The hay crop thickened up wonderfully, though very little was saved during the month. August was favourable for haymaking, and a good crop of hay was saved in splendid condition. August and September were quite favourable to the root crops. October was very wet, the weather was warm and the roots grew to a great size. Some rot was reported. November came in cold, and it was not until the second week that the bulk of the turnips was saved.

INDIAN CORN.

The corn was planted in hills on the 5th of June. Fourteen tons of barnyard manure had been applied and well worked into the land two weeks before planting. The corn came up slowly and then remained almost stationary until the end of June. On the whole, the season was very unfavourable for the corn crop.

On rotation "G" where the Longfellow corn was grown, it gave a yield of 4 tons and 80 pounds of dry stover per acre. The corn was in silk when harvested on October 9. The blackbirds injured this field about 30 per cent.

In the variety test plots, the damage inflicted by various birds was still greater, and, as a matter of fact, the data for the season's tests were rendered practically useless. The pigeons and blackbirds had destroyed the test plots of varieties before it was realized what they were doing. Provision was made to prevent the crows from taking the corn, but ordinary devices were of no use against these other marauders. They were shot and poisoned; but the data from the season's crop were destroyed by them.

FIELD ROOTS.

The variety tests of field roots were sown in the new orchard on the following dates: Mangels, May 12; sugar beets and carrots, May 26; and turnips, May 31.

During the month of June the growth was rather slow, the weather being dull and cool. The frequent showers and the moderate temperatures of July were very favourable to the root crop, as were also August and September.

On account of the growing season being ideal for roots, large crops have been harvested, except of carrots, which were destroyed by the Carrot Rust Fly immediately after they were thinned.

A check row was left on either side of each row of fruit trees. The cut-worms were plentiful, but the poisoned bran proved satisfactory in destroying these pests. The cut-worms, however, caused a few misses among all of the roots. The percentage being about equal in all varieties the loss was not considered.

TURNIPS.

Twelve varieties of swede turnips were sown on May 31, and pulled November 13, 1912. The soil was fairly light in character. Twelve tons of manure were disced into the land. The turnips were sown in drills 30 inches apart and the young plants thinned to about 14 inches in the rows. The yields were computed from one-hundredth acre plots.

TURNIPS.—Test of Varieties.

No.	Name of Variety.	Yield per acre.		Yield per acre.	
		Tons	Lb.	Bush.	Lb.
1	Jumbo	36	....	1,200	..
2	Hazard's Improved	35	1,800	1,196	40
3	Mammoth Clyde	34	500	1,141	40
4	Hall's Westbury	33	1,500	1,125	..
5	Good Luck	32	500	1,075	..
6	Hartley's Bronze Top	31	1,500	1,058	20
7	Bangholm	31	1,500	1,058	20
8	Perfection	31	500	1,041	40
9	Magnum Bonum	31	500	1,041	40
10	New Century	30	500	1,008	20
11	Lapland	28	1,000	950	..
12	Halewood's Bronze Top	26	1,500	891	40
	Average	31	1,941	1,065	41

MANGELS.

Twelve varieties of mangels were sown on May 17, in drills 30 inches apart. The young plants were thinned to about 12 inches apart in the rows. The roots were pulled October 21.

MANGELS.—Test of Varieties.

No.	Name of Variety.	Description of Variety.	Yield per acre.		Yield per acre.	
			Tons	Lb.	Bush.	Lb.
1	Giant Yellow Globe	Globe	36	1,260	1,221	..
2	Charlottetown Exp. Sta. seed	Long Red	34	508	1,141	48
3	Selected Yellow Globe	Globe	33	596	1,106	36
4	Danish Sludstrup	Intermediate	32	1,862	1,097	42
5	Gate Post	Long Red	32	20	1,067	..
6	Prize Mammoth Long Red	Long Red	31	1,624	1,060	24
7	Yellow Leviathan	Intermediate	30	588	1,009	48
8	Giant Yellow Intermediate	Intermediate	30	192	1,003	12
9	Mammoth Long Red	Long Red	29	1,196	986	36
10	Giant Half Sugar White	Long White	29	872	981	12
11	Perfection Mammoth Red	Long Red	26	1,856	897	36
12	Golden Tankard	Globe	24	180	803	..
	Average		30	1,879	1,031	19

SUGAR BEETS.

Three plots of sugar beets were sown on May 28 and harvested November 1, 1913. The soil was a friable sandy loam.

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Improved Vilmorin B	15	1,122	519	12
2	Klein Wanzleben	15	1,020	517	..
3	Improved Vilmorin A	14	1,436	490	36
	Average	15	536	508	56

ALFALFA, CLOVER, AND GRASSES.

The grasses, alfalfa, and clovers came through the hard winter fairly well. The warm weather brought them nearly two weeks ahead of the season of 1912. During May and June they came on slowly, yet made satisfactory growth. During July the crops thickened up wonderfully and as August was very favourable for haymaking, a good crop of hay was saved in splendid condition.

The Red Top grass led with a yield at the rate of 3 tons per acre. Kentucky Blue grass was next with 2 tons 1,220 pounds, then Late Swedish Red clover, 2 tons 320 pounds. The Mammoth Red gave 1 ton 1,181 pounds, Common Red 1 ton 580 pounds, and Alsike 1 ton 820 pounds.

ALFALFA.

The experiments with alfalfa would indicate that the Grimm is superior in hardiness to the other sorts tested. The test with different rates of barley sown as a nurse crop with alfalfa would indicate that under favourable conditions the alfalfa does much better without a nurse crop.

The first cutting of the crops, on July 16, gave an average yield per acre of 1 ton 1,360 pounds, for Grimm. Other varieties gave an average yield of 1 ton 320 pounds per acre. Those sown with nurse crops gave only an average yield of 1, 616 pounds per acre. The land on which the alfalfa grew was tile-drained in midsummer, which destroyed the records of the second cutting.

RED CLOVER.

On the rotations, the Common Red clover was a good, strong crop. On a few areas, Mammoth Red clover was about equal to the Common Red. The average yield on 15·5 acres of the land owned by the Station, previous to 1913, was 2 tons 260 pounds per acre. On the new area acquired in 1913, a total of 9 acres was allowed to remain for hay. This land had been cut for hay several times, apparently under no rotation system, and most of it was in need of tile drainage. The average yield from these areas was 1,622 pounds per acre. The difference in the quality of the hay was even greater than the difference in the weights. That grown on the farm rotations was largely clover, while that grown on the other areas was largely natural grass.

The above would indicate that the shortening of the period that land is left in hay and the use of systematic farm rotation would, in a few years, not only greatly increase the yield of hay but would add materially to the percentage of clover that may be grown on the same land by good cultural methods.

NEW EXPERIMENTS.

A further series of experiments was laid out and the plots sown on June 30. This series included thirty-four different sorts of grasses and clovers. The plots were sown in duplicate.

CHARLOTTETOWN.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

CHARACTER OF SEASON.

The month of June was rather cooler than usual, the highest temperature being 10° lower than the highest for June, 1912. The precipitation was also lighter than for the same period in 1912. On account thereof, all vegetation made very slow growth, especially during the first part of the month.

During July the vegetation made a remarkable growth, in spite of the prevalence of cool weather. Roots, especially, advanced very rapidly. Haying was delayed a few days by rainy weather, but the greater part of the clover was saved in good condition.

During August, roots continued to make very rapid growth, and during September the weather was on the whole also favourable for root growing.

On account, however, of the heavy and continuous rainfall during October, much damage was done to the root crops which were harvested during the latter part of the month and the first part of November.

INDIAN CORN.

Five varieties were sown in uniform test plots, in duplicate sets of one-hundredth of an acre. The land was a clay loam and prepared in the same way as for turnips, only the manure was not ploughed under until the second ploughing, *i.e.*, in the spring of 1913.

Seed was sown on May 28 at the rate of 10 pounds per acre.

The yield per acre is calculated from the yield of two rows 72½ feet long and 36 inches apart.

The land was hoed twice and cultivated four times during the season with a one-horse cultivator.

The following table gives the comparative results:—

INDIAN CORN.—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Weight per Acre.	
				Inches.		Tons.	Lb.
1	Ninety Days	May 28.	Oct. 1	78	Milk stage	14	1,100
2	Early Longfellow	" 28.	" 1	75	Soft glazed	14	850
3	Compton's Early	" 28.	" 1	74	Soft glazed	14	500
4	Salzer's North Dakota	" 28	" 1	77	Milk stage	13	550
5	Canada Yellow	" 28.	" 1	56	Glazed	12	250
	Average					13	1,450

It will be noted from the above table that it was quite late when the corn was planted; hence it did not get very well matured.

It will also be noted that Ninety Days, Early Longfellow, and Compton's Early were three of the heaviest yielders, giving 14 tons 1,100 pounds, 14 tons 850 pounds, and 14 tons 500 pounds, respectively; also that the latter two were better matured than the former, being in the soft glaze stage. Canada Yellow, though the lightest yielder, was still more matured than any of the other varieties, and as it is a Nova Scotia seed, it will no doubt become a very useful corn for this section, due to its early maturing qualities.

The following three varieties for this section can therefore be recommended: Canada Yellow, Early Longfellow, and Compton's Early.

TURNIPS.

Twelve varieties of turnips were sown in uniform plots, in duplicate sets of one hundredth of an acre each. The two plots of each variety were not placed side by side but on different parts of the experimental field.

The land was a clay loam, which had been pastured the previous summer, manured at the rate of 20 tons per acre, and ploughed under in the fall of 1912. In the spring of 1913 it was cutaway-harrowed once, ploughed the second time, and cutaway-harrowed twice. Then a commercial fertilizer made up of the following mixture: Superphosphate 1½ pounds; bone meal, 1½ pounds; nitrate of soda, 1 pound; muriate of potash, 1 pound; was sown at a rate of 400 pounds per acre, and harrowed in with a smoothing harrow. The seed was sown with a Planet Jr. hand drill at the rate of 3 pounds per acre. The turnips were hoed twice, and thinned out to about 12 inches apart in the rows. They were cultivated five times during the season.

The following table gives the comparative results, calculated from the average yield of the two plots of each variety.

TURNIPS.—Test of Varieties.

No.	Name of Variety.	Sown.	Pulled.	Yield per Acre.		Yield per Acre.	
				Tons.	Lb.	Bush.	Lb.
1	Hall's Westbury	May 21	Oct. 31	35	1,600	1,183	20
2	Magnum Bonum	" 21	Nov. 1	38	1,350	1,289	10
3	Hartley's Bronze Top	" 21	" 1	34	500	1,141	10
4	Halewood's Bronze Top	" 21	" 1	32	1,750	1,095	50
5	Perfection	" 21	" 1	35	1,750	1,195	50
6	Good Luck	" 21	" 1	42	750	1,412	30
7	Jumbo	" 21	" 1	39	1,250	1,320	50
8	Mammoth Clyde	" 21	" 1	37	750	1,245	50
9	Bangholm Selected	" 21	" 1	35	1,250	1,187	50
10	Corning Lapland	" 21	" 1	35	1,000	1 183	20
11	New Century	" 21	" 1	39	2 0	1,304	10
12	Hazard's Improved	" 21	" 1	35	500	1,175	..
	Average			36	1,675	1,227	55

Note from the above table that Good Luck gave 42 tons 750 pounds; Jumbo, 39 tons 1,250 pounds; New Century, 39 tons 250 pounds; Magnum Bonum, 38 tons 1,350 pounds; and Mammoth Clyde, 37 tons 750 pounds per acre, all of which are good yields.

NAPPAN.

MANGELS.

Eleven varieties of mangels were sown in uniform test plots, in duplicate sets of one-hundredth of an acre each. The land was a clay loam and received the same method of treatment as that allotted to turnips; also the same cultivation.

All seed was sown on May 21 at the rate of 6 pounds per acre. The rows were 28 inches apart and the plants 12 inches apart in the rows.

The following table gives the comparative results:—

MANGELS.—Test of Varieties.

No.	Name of Variety.	Sown.	Pulled.	Yield per Acre.		Yield per Acre.	
				Tons.	Lb.	Bush.	Lb.
1	Giant Yellow Globe	May 31	Oct. 24	26	750	879	10
2	Selected Yellow Globe	" 31	" 24	25	1,000	850	..
3	Golden Tankard	" 31	" 24	22	....	733	20
4	Gate Post	" 31	" 24	22	....	733	20
5	Mammoth Long Red	" 31	" 24	23	....	766	40
6	Perfection Long Red	" 31	" 24	23	1,900	798	20
7	Prize Mammoth Long Red	" 31	" 24	23	1,350	789	10
8	Danish Sludstrup	" 31	" 24	28	1,100	951	40
9	Giant Yellow Intermediate	" 31	" 24	26	1,550	892	30
10	Yellow Leviathan	" 31	" 24	31	850	1,047	30
11	Giant Half Sugar White	" 31	" 24	30	1,500	1,025	..
	Average			25	1,636	860	36

From the above table it will be noted that Yellow Leviathan, Giant Half Sugar White, and Danish Sludstrup are the heaviest yielders, yielding 31 tons 850 pounds; 30 tons 1,500 pounds; and 28 tons 1,100 pounds, respectively.

FIELD CROP OF MANGELS.

Three varieties of mangels were sown on one-third of an acre each. The land was clay loam and treated in the same way as for turnips. It also received the same cultivation.

The following table gives the comparative results:—

FIELD CROP OF MANGELS.—Sown, June 23; pulled, October 29.

	Yield per Acre.		Yield per Acre.	
	Tons	Lb.	Bush.	Lb.
⅓ acre Long Red	18	120	602	..
⅓ " Yellow Intermediate	20	140	669	..
⅓ " Yellow Globe	19	1,795	663	15
Average	19	685	644	45

From the above table it will be noted that Yellow Intermediate gave the heaviest yield, Yellow Globe came second, and Long Red third. Any one of these three varieties is to be recommended for this district.

CARROTS.

Six varieties of carrots were sown in uniform test plots, in duplicate sets of one-hundredth of an acre each. The land was clay loam, prepared in the same way as that allotted to turnips. The seed was sown on May 22 with a Planet Jr. hand drill. The carrots were thinned twice and left the last time about 4 to 5 inches apart in the rows, which were 28 inches apart. The land was horse cultivated five times during the season.

A much better yield would have been realized had not the ground been very badly infested with couch grass.

The following table gives the comparative results:—

CARROTS.—Test of Varieties.

No.	Name of Variety.	Sown.	Pulled.	Yield per acre.		Yield per acre.	
				Tons.	Lb.	Bush.	Lb.
1	Ontario Champion	May 22	Nov. 4	21	500	708	20
2	Half Long Chantenay	" 22	" 4	20	...	666	40
3	Mammoth White Intermediate	" 22	" 4	21	250	704	10
4	Giant White Vosges	" 22	" 4	17	...	565	40
5	White Belgian	" 22	" 4	18	1,000	616	40
6	Improved Short White	" 22	" 4	21	250	704	10
	Average			19	1,666	661	6

The results of the above variety tests show that Ontario Champion, Mammoth White Intermediate, and Improved Short White gave 21 tons 500 pounds, 21 tons 250 pounds, and 21 tons 250 pounds, respectively, all of which are fairly good yields. Any one of these varieties can be recommended for use in this district.

Half Long Chantenay is a fair yielder, as well as being an excellent table carrot.

SUGAR BEETS.

Three varieties of sugar beets were sown in uniform test plots of one-hundredth of an acre. The land was a clay loam, treated in the same way as for turnips. The sugar beets were hoed twice, the last hoeing leaving them about 12 inches apart in the rows, with the rows 28 inches apart. They were cultivated five times during the season.

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Sown.	Pulled.	Yield per acre.		Yield per acre.	
				Tons.	Lb.	Bush.	Lb.
1	Vilmorin's Improved "A"	May 22	Oct. 30	15	1,100	518	20
2	Vilmorin's Improved "B"	" 22	" 30	14	300	471	10
3	Klein Wanzleben	" 22	" 30	11	350	372	30
	Average			13	1,250	453	70

EXPERIMENTS WITH CLOVER AND GRASSES.

Some five pounds of Red clover seed were sown in uniform test plots of one-hundredth of an acre each, in duplicate sets. The previous crop was grain. The land was of clay loam and was ploughed in the spring of 1913, also well cultivated. A light dressing of commercial fertilizer was sown (200 pounds per acre) and harrowed in with a smoothing harrow. Seed was sown on June 10 at the rate of 25 pounds per acre.

The object of these experiments with Red clover is to try to produce, by means of natural selection, varieties of Red clover which will prove perfectly hardy in this climate and at the same time to demonstrate, if possible, the value of home-grown seed.

It is the general belief that the partial killing of Red clover is due, to a very great extent at least, to the fact that an ordinary clover field is composed of a mixture of different types, some of which are hardy and therefore persist, while others are not so hardy and therefore perish.

Hence by selecting seed year after year from those plants which prove to be hardy, it is hoped to obtain a type of Red clover which will not only increase in hardiness but likewise give an increase in yield.

In order then to arrive at a definite conclusion on this double question, the plots were sown in duplicate sets, one of which will be used for hay production the other for seed production.

A similar experiment is being carried out with grasses. Five lots were sown in uniform test plots of one-hundredth of an acre. The land was of clay loam, treated identically the same as for clover, and one set of plots will be used for hay production and the other for seed production.

This experiment in seed selection and improvement should emphatically appeal to every farmer as a proposition worthy of note in the development of agriculture. It cannot be emphasized too strongly, as there is no other way whereby so much can be gained as by careful seed selection.

ALFALFA.

Up to this date alfalfa has not proven to be a very profitable crop in Nova Scotia. While at the Experimental Farm very good catches have been procured during the first season's growth, it has invariably been winter-killed, partially so at least. In the plots where it has been sown in previous years, during this season a very creditable stand was realized, but only in patches.

EXPERIMENTAL STATION, KENTVILLE, N. S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR.

CHARACTER OF SEASON.

The season was not entirely favourable for forage crops owing to a continued dry period during June. The early and late part of the season was favourable for all root crops. Owing to the early spring being cool, followed by little rain, the corn did not make satisfactory growth.

The mean average temperature, rainfall, and sunshine for the summer season was as follows:—

Month.	Mean Average temperature.	Rainfall.	Sunshine.
	°	Inches.	Hours.
April	41·9	4·29	137·1
May	46·2	3·17	178·2
June	56·7	1·23	270·1
July	65·4	3·72	252·1
August	63·3	1·70	238·4
September	54·3	2·55	156·6
October	56·5	9·60	57·8

INDIAN CORN.

Five varieties of Indian corn were sown, but owing to the poor soil on which they were planted and the cool weather following they made a very unsatisfactory growth. The resulting crop was so uneven that the test was considered unreliable, consequently no weights were taken.

FIELD ROOTS.

The ground on which these were grown was a poor sandy loam. Thirty tons of stable manure were applied per acre the previous fall and ploughed under. The ground was ploughed this spring and well worked up. Commercial fertilizers were then sown broadcast at the rate of 500 pounds to the acre, and harrowed in before planting. This fertilizer was made up of 150 pounds nitrate of soda, 150 pounds sulphate of ammonia, 600 pounds acid phosphate (15 per cent), and 300 pounds muriate of potash, which were well mixed together. The resulting mixture contained approximately 4½ per cent nitrogen, 7½ per cent phosphoric acid, and 12½ per cent potash.

TURNIPS.

Twelve varieties of turnips were tested in duplicate plots. The plots were each 1/132 of an acre, or two rows 66 feet long and 30 inches apart. The seed was sown

May 17, and the plants later thinned to 1 foot apart. The crop was harvested on October 24. The yield per acre is an average from the yield of the two plots of each variety.

TURNIPS.—Test of Varieties.

No.	Name of Variety.	Yield per acre.		Yield per acre.	
		Tons.	Lb.	Bush.	Lb.
1	Hall's Westbury	38	1,220	1,287	
2	New Century	38	1,220	1,287	
3	Hartley's Bronze Top	38	560	1,276	
4	Good Luck	34	1,960	1,166	
5	Jumbo	33	1,980	1,133	
6	Perfection	33	1,320	1,122	
7	Mammoth Clyde	30	1,380	1,023	
8	Bangholm	30	1,380	1,023	
9	Hazard's Improved	30	60	1,001	
10	Lapland	28	760	946	
11	Halewood's Bronze Top	27	1,440	924	
12	Magnum Bonum	23	1,520	792	
	Average	32	200	1,081	40

MANGELS.

Eleven varieties of mangels were planted in duplicate plots of two rows, each 66 feet long and 30 inches apart, or $\frac{1}{132}$ of an acre. The seed was sown on May 21, the plants thinned to 1 foot apart, and the crop harvested on October 23. The yield per acre is an average from the yield of the two plots of each variety.

MANGELS.—Test of Varieties.

No.	Name of Variety.	Yield per acre.		Yield per acre.	
		Tons.	Lb.	Bush.	Lb.
1	Giant Yellow Intermediate	27	120	902	
2	Prize Mammoth Long Red	26	800	880	
3	Danish Sludstrup	26	800	880	
4	Mammoth Long Red	26	800	880	
5	Giant Yellow Globe	22	880	748	
6	Gate Post	21	1,560	726	
7	Yellow Leviathan	21	240	704	
8	Selected Yellow Globe	20	920	682	
9	Giant Half Sugar White	20	392	673	12
10	Perfection Mammoth Red	17	320	572	
11	Golden Tankard	13	1,720	462	
	Average	22	232	737	12

KENTVILLE.

CARROTS.

Six varieties of carrots were planted in duplicate plots of two rows, each 66 feet long and 30 inches apart, or $\frac{1}{132}$ of an acre. The seed was sown May 17, and the plants thinned to 4 inches apart. The crop was harvested October 24. The yield per acre is an average from the yield of the two plots of each variety.

CARROTS.—Test of Varieties.

No.	Name of Variety.	Yield per acre.		Yield per acre.	
		Tons.	Lb.	Bush.	Lb.
1	Improved Short White	15	1,020	517	
2	White Belgian	15	1,020	517	
3	Giant White Vosges	13	400	440	
4	Ontario Champion	11	1,000	383	20
5	Half Long Chantenay	11	1,000	383	20
6	Mammoth White Intermediate	11	440	374	
	Average	13	147	435	47

SUGAR BEETS.

Three varieties of sugar beets were planted in duplicate plots of two rows, each 66 feet long and 30 inches apart, or $\frac{1}{132}$ of an acre. The seed was sown May 17, the plants were thinned to 8 inches apart, and the crop harvested October 23.

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Yield per acre.		Yield per acre.	
		Tons.	Lb.	Bush.	Lb.
1	Vilmorin Improved (A)	14	512	475	12
2	" " (B)	12	1,872	431	12
3	Klein Wanzleben	11	176	369	36
	Average	12	1,520	425	20

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

INDIAN CORN.

Four varieties of Indian corn were grown for ensilage. Planting was done on the 5th and 6th of June. The ground was a naturally well-drained sandy loam that had been cutting good crops of hay for several years. A portion had a heavy crop of clover last year. It was ploughed in October, 1912, and worked up with a disc harrow in the spring. On account of the cold wet weather during May, and the fact that the land was badly infested with couch and mustard, planting was not done till date above mentioned. Horse stable manure was applied at the rate of eighteen 35-bushel loads per acre, and on the 12½ acres there was applied at the time of planting a mixture of 975 pounds nitrate of soda, 325 pounds sulphate of ammonia, 3,900 pounds acid phosphate, and 650 pounds muriate of potash, equal to 468 pounds high-grade mixed fertilizer per acre, analysing 3·6 per cent nitrogen, 10 per cent phosphoric acid, and 5·5 per cent potash, or equal to 936 pounds low-grade mixture, with 1·8 per cent nitrogen, 5 per cent phosphoric acid, and 2·7 per cent potash.

On account of the cold weather the seed germinated very slowly, no plants appearing until the 21st of June, and then coming up very irregularly. There was no stand of plants until the 1st of July.

Before the corn plants appeared a spike-tooth harrow was run cross wise of the rows and as soon as the rows could be followed a one-horse scuffler was run between the rows. The scuffler was put through the field once a week until the corn got too high. On account of the couch grass and mustard in the ground, two thorough hand hoeings were found necessary. The hand labour made the cultivation pretty costly, and would be quite unnecessary on reasonably clean ground.

The varieties grown, height of stalk, degree of maturity, and acreage of each were as follows:—

No.	Variety.	Acreage.	Length of Stalk.	Degree of Maturity.
		Acres.	Inches.	
1	Longfellow	3	82	Ears formed; thin milky stage.
2	Leaming	3	94	Ears formed; watery stage.
3	White Cap Yellow Dent	5	84	Ears formed; white milky stage.
4	Compton's Early	1	80	Ears formed; thin milky stage.

No facilities were available for weighing the crop. It was cut and bound from the 25th September to 1st October, cut into ¾-inch lengths, and put in the silo. The resulting ensilage had a clean aroma, with but slight acidity.

The yield from the 12½ acres, according to the cubic contents of the silo, was between 110 and 115 tons.

TURNIPS.

Five acres of land, a sandy loam with clay subsoil lately broken from the forest and in oats last year, with a good catch of clover, was sown to turnips. The land had many stumps, large boulders, and much surface stone. The stumps and large boulders were blown out and broken up with dynamite, and 500 loads of stone removed. The time taken in clearing and preparing the land delayed seeding.

Horse-stable manure was applied at the rate of twenty 35-bushel loads per acre, and worked in with a disc harrow. In addition to the stable manure, chemical fertilizer was applied in the following quantities per acre: 70 pounds nitrate of soda, 70 pounds sulphate of ammonia, 100 pounds acid phosphate, 100 pounds basic slag, equal to an application of 860 pounds mixed fertilizer per acre, analyzing 3·14 per cent nitrogen, 10·23 per cent phosphoric acid, and 6·97 per cent potash.

The basic slag was applied by itself with the fertilizer attachment on a grain drill and the other chemicals were mixed together and sown with the fertilizer attachment on a two-row potato planter. The slight ridges left by the planter were added to by going over with a horse hoe. Where there were many small roots or straw from the manure the rows were dressed off with a dung fork and a roller was put on to consolidate them. The seed was sown with a hand wheel seeder at the rate of 2 pounds to the acre. The stand was rather thin and the crop was some time in getting away, as the weather was pretty dry. The seed was sown on the 4th and 5th of July. The crop was harvested on the 3rd, 4th, and 5th of November.

TURNIPS.—Test of Varieties.

No.	Variety.	Description.	Yield per Acre.		Yield per Acre.	
			Tons.	Lb.	Bush.	Lb.
1	Invicta	Purple-top swede, smooth and even	15	1,500	525	
2	Lapland	Green-top swede, rooty and uneven	14	35	467	15
3	Good Luck	Purple-top swede, smooth and fairly even	19	400	640	
4	Halewood's Bronze Top	Bronze-top swede, smooth and even	16	175	535	15
5	Hall's Westbury	Purple-top swede, smooth, even and very shapely	14	800	480	
6	Hartley's Bronze Top	Bronze-top swede, fairly smooth and even	18	1,350	622	30
7	Jumbo	Purple-top swede, rather rough	17	80	568	
8	Perfection	Purple-top swede, large, even, fairly smooth	26	800	880	
9	Bangholm	Purple-top swede, smooth and even	21	....	700	
10	Hazard's Improved	Purple-top swede, smooth and even	20	800	680	
11	New Century	Purple-top swede, large, fairly smooth, uneven	27	360	906	
		Average	19	209	636	49

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

REPORT OF THE SUPERINTENDENT, JOSEPH BEGIN.

CHARACTER OF SEASON.

Rains and thaws of last winter were responsible for entirely killing clover, and generally for heavy damage to the meadows. Snow all disappeared in March, and the spring was very cold and dry up to May 13. From this last date to June 6, rain prevailed and the weather was rather cold.

The average temperature from the 1st of May to the 31st of October, 1913, was 55·2°. For the three months, July, August, and September, the average registered was 60·1°. From this it would appear that the temperature is as high, if not higher, than the temperature registered in the inland part of the country at the same latitude; it would also appear to be 2·02° lower than the average temperature registered at Ottawa during ten years.

It might be well to note here that the temperature registered at the Station once a day does not represent the exact temperature of the district, as it is well known that the duration of heat during the day is shortened by what is called "maritime streams" or fresh and cool breezes, blowing at certain hours from the St. Lawrence river. These lower the temperature many degrees and check the growing of certain plants, such as corn. In future, therefore, it is intended to note the temperature three times a day, at 6 a.m., at 12 noon, and at 6 p.m., to compare the average temperature given by these observations with the average temperature registered once a day at 7 a.m.

INDIAN CORN.

Eight acres of Longfellow corn were sown from the 10th to the 13th of June, and cut between the 25th and 29th of September. The average height of this corn was 5 feet only, the germination being very slow on account of lack of rain. The cobs were abundant but short, and the desirable dough stage was not reached. The yield of corn was estimated at 4 tons per acre.

It is to be noted that on account of the very small quantity of barnyard manure at hand, the land received but a light coat of manure. Weeds of all sorts also infested the land where corn was sown. Also, on account of the new division of the field and the levelling of the land, the soil was not in the very best condition for a good crop. However, the land having been worked all through the summer, it is now well prepared for good crops, and weeds are fairly well eradicated.

ROOTS.

The crop of 1⅓ acres sown in roots, viz., Magnum Bonum from Sutton, yielded 62,000 pounds or 27 tons per acre. This field was drained in the autumn of 1912, well prepared and manured in the spring. Sown on the 18th of June, the seed did not germinate until the middle of July, but the growth was splendid in September and October. The crop was stored in good condition.

HAY CROPS.

About 12 per cent less than the common average, the hay was also rather inferior in quality. One acre and a half sown with peas and oats gave a splendid crop, calculated at 2½ tons per acre. Sown on the 10th of May, cut on the 15th of August, and stored on the 20th of the same month, this mixture of peas and oats made a hay of good quality.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, G. A. LANGELIER.

CHARACTER OF SEASON.

The past year was not very favourable for forage crops. The mild weather, during winter, left many pastures and meadows bare, and most of the clover was killed. The temperature was rather cool during May and the earlier part of June, 36·2° F. being registered as late as the 27th of the first-mentioned month and on the 10th of the latter. But there was a marked improvement afterwards, and though hay was ready to cut later than usual, it gave a much better crop than had been expected.

August and the three first weeks of September were very dry, and this checked Indian corn and roots. The first did not recover, though farmers who cultivated often to conserve moisture fared much better than the others who did not. However, with the frost which nipped it on the night of September 14, corn gave a yield which may be put down as 25 per cent lower than the average. This, after the very unfavourable season of 1912, no doubt discouraged quite a number of farmers who would have built silos later on.

The cool nights of September and October helped out the roots which gave an average crop; it would have been a heavy one only for the drought of the latter end of the summer.

The early part of the season was very favourable to the germination and growth of clover and grass seed, and as the young grass was still shaded by the nurse crop of grain during the worst part of the drought, there was a very good catch. With snow before the ground froze too hard, and average weather next spring, it may be expected that the 1914 crop of hay will be a good and even a very good one.

EXPERIMENTS WITH INDIAN CORN AND FIELD ROOTS.

Fourteen varieties of turnips, eleven of mangels, three of sugar beets, six of carrots, and eleven of Indian corn were tried on duplicate plots of $\frac{1}{50}$ acre each for the roots, and $\frac{1}{100}$ acre for the corn. There were two check rows at the ends of the experimental field, and also between each kind of forage crop, so that no variety had more room or light than any other one.

INDIAN CORN.

Seven varieties were tested in 1913 on a piece of uniform sandy loam, with shaly subsoil at from 15 to 24 inches. This piece of land was also in corn in 1912, but as that season was so unfavourable, the yield was very low and it practically could not be of much detriment to the crop of 1913. As manure was used both seasons, it seems that the yield should have been higher. Corn was badly frosted on September 14, and only cut on the 29th, so that it must have lost at least 25 per cent of its weight. Even then, it was quite below expectations.

The land was ploughed in October, 1912, and during the first half of May, 1913, it was disced twice with a big cutaway, harrowed twice with the spike-tooth, rolled and sown with the hand Planet Jr. in rows 36 inches apart. A few days afterwards the smoothing harrows were passed over the ground, and later the corn was thinned to about 8 inches between plants.

The following table gives information as to the varieties tested in 1913:—

INDIAN CORN.—Test of Varieties.

No.	Name of variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when cut.	Weight per acre.
				Inches.		Tons lb.
1	Ninety Days	May 15	Sept. 29	92	Full milk	9 1,600
2	Salzer's North Dakota	" 15	" 29	84	" "	9
3	White Cap Yellow Dent	" 15	" 29	89	" "	8 1,600
4	Early Longfellow	" 15	" 29	78	" "	7 1,600
5	Compton's Early	" 15	" 29	83	" "	6
6	Canada Yellow	" 15	" 29	63	Half ripe' half glazed.	5 1,800
7	Longfellow	" 15	" 29	56	Half full milk.	5
					Average	7 943

TURNIPS.

Fourteen varieties were tested in 1913 on a piece of uniform sandy loam with a shaly subsoil at from 15 to 24 inches. The land was in Indian corn the previous year and was ploughed in October. In the latter part of April, 1913, it received an application of 25 tons of cow manure per acre, was diseed twice with a double cutaway, passed over twice with the smoothing harrows, rolled, ridged, and sown with the hand Planet Jr. machine. About 5 pounds of seed were used per acre. The drills were 28 inches apart and the turnips were singled to about 8 inches in the row. Notes are given here concerning the varieties tested in 1913 also regarding all varieties tested during the last three years.

A few typical roots were saved to grow seed in 1914. There is no reason why turnip seed should not be produced in this district as seems to be done with success in the Maritime provinces.

TURNIPS.—Test of Varieties.

No.	Name of variety.	Date of sowing.	Date of pulling.	Description of variety.		Yield per acre.	Yield per acre.
				Size.	Leaves.	Tons. Lb.	Bush. Lb.
1	Hall's Westbury	May 13.	Oct. 22 and 24	Large	Too big; too numerous	23 500	775
2	Magnum Bonum	" 13	" 22 " 24	Medium	Small; few	23 400	773 20
3	Hazard's Improved	" 13.	" 22 " 24	Large, round	small; too numerous	22 1,450	757 30
4	Hartley's Bronze Top	" 13.	" 22 " 24	Medium, oval	Too big; too numerous	21 1,700	728 20
5	Good Luck	" 13.	" 22 " 24	Medium, round	Small; few	21 1,600	726 40
6	Jumbo	" 13	" 22 " 24	Medium, too long	Small; few	21 1,400	723 20
7	New Century	" 13.	" 22 " 24	Medium, round	Small; few	21 1,300	721 40
8	Mammoth Clyde	" 13.	" 22 " 24	Large, round	Too big; too numerous	20 900	681 40
9	Ostersundom	" 13.	" 22 " 24	Medium, too long	Big; too numerous	20 900	681 40
10	Lapland	" 13.	" 22 " 24	Medium, round	Small; few	20 750	679 10
11	Perfection	" 13.	" 22 " 24	Medium, round	Small; few	18 1,900	631 40
12	Stubb	" 13.	" 22 " 24	White, large, oval	Too big; few	18 1,900	631 40
13	Halewood's Bronze Top	" 13.	" 22 " 24	Medium, oval	Too big; too numerous	18	600
14	Bangholm Selected	" 13.	" 22 " 24	Medium, round	Too big; few	16 1,750	562 30
					Average	20 1,461	691 1

CAP ROUGE.

TURNIPS.—Average Yields.

Name of Variety.	1911 Yield.		1912 Yield.		1913 Yield.		Average Yield.	
	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.
Good Luck	26	1,122	11	1,265	21	1,600	19	1,993
Hartley's Bronze Top	22	718	15	855	21	1,700	19	1,758
Jumbo	23	105	14	875	21	1,400	19	1,460
Magnum Bonum	21	1,344	9	1,965	23	400	19	570
Hall's Westbury	19	1,321	14	1,040	23	500	19	287
Perfection	20	1,865	14	1,700	18	1,900	18	488
Mammoth Clyde	22	949	11	440	20	900	18	96
Bangholm Selected	21	1,639	12	585	16	1,750	16	1,991
Halewood's Bronze Top	22	1,874	6	1,612	18	.....	15	1,829

MANGELS.

Eleven varieties were tested in 1913 on a uniform piece of sandy loam with shale as a subsoil at from 15 to 24 inches. The ground was in Indian corn the previous year and was ploughed in October. In the latter part of April, 1913, it received 25 tons of manure per acre, was disced twice with a big cutaway, harrowed twice with the spike-tooth, rolled, ridged, and sown with the Planet Jr. hand machine. Eight pounds of seed were used per acre. The drills were 28 inches apart and the plants were thinned to 8 inches in the row. Notes are given here concerning the varieties tested in 1913, also regarding all varieties tested since 1911, inclusively.

MANGELS.—Test of Varieties.

No.	Name of Variety.	Sown.	Pulled.	Yield per Acre.		Yield per Acre.	
				Tons.	Lb.	Bush.	Lb.
1	Prize Mammoth Long Red	May 13	Oct. 23 and 30	3	1,200	120	
2	Giant Half Sugar White	" 13	" 23 and 30	2	1,899	98	10
3	Giant Yellow Intermediate	" 13	" 23 and 30	2	890	81	30
4	Gate Post	" 13	" 23 and 30	2	860	81	
5	Selected Yellow Globe	" 13	" 23 and 30	2	770	79	30
6	Giant Yellow Globe	" 13	" 23 and 30	2	110	69	
7	Yellow Leviathan	" 13	" 23 and 30	1	1,660	61	
8	Perfection Mammoth Red	" 13	" 23 and 30	1	1,630	60	30
9	Mammoth Long Red	" 13	" 23 and 30	1	1,130	57	10
10	Danish Sludstrup	" 13	" 23 and 30	1	1,030	50	30
11	Golden Tankard	" 13	" 23 and 30	1	700	45	
			Average	2	382	73	2

MANGELS.—Average Yields.

Name of Variety.	1911 Yield.		1912 Yield		1913 Yield.		Average Yield.	
	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons	Lb.
Giant Yellow Intermediate	9	1,429	2	1,280	2	890	4	1,866
Gate Post	7	263		1,485	2	860	3	869
Prize Mammoth Long Red	4	1,021	1	1,135	3	1,200	3	452
Selected Yellow Globe	3	553	1	1,960	2	770	2	1,094
Giant Yellow Globe	4	18		1,815	2	140	2	658

Turnips always give a surer crop than mangels in this district, so much so that hardly any mangels are grown.

During 1911, 1912, and 1913, fifteen varieties of turnips were used which gave an average of 37,763 pounds per acre, whilst twelve varieties of mangels produced an average of 6,251 pounds. There was one very good season, one very bad one, and one medium. Two different kinds of soils were tried and the result was always the same. It may be here said that excepting on the low moist lands of the valleys of rivers, everybody has experienced the same trouble in growing mangels, in this district.

CARROTS.

Six varieties were tried on a uniform piece of sandy loam with a shaly subsoil at from 15 to 24 inches. It was in Indian corn in 1912 and was ploughed in October. During the latter part of April, 1913, the land was disced twice with the big cutaway, harrowed twice with the spike-tooth, rolled, ribbed, and sown at the rate of 5 pounds per acre with the hand Planet Jr. machine. The drills were 28 inches apart and the plants were thinned to 6 inches in the row. Following are notes about yield in 1913, also about all varieties tested during the last three years.

Carrots no doubt are the best roots to grow for adding succulence to the ration of horses during winter. The Improved Short White seems to be one which succeeds best here.

CARROTS.—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Pulling.	Description of Variety.	Yield per Acre.		Yield per Acre.	
					Tons.	Lb.	Bush.	Lb.
1	Ontario Champion	May 13.	Oct. 23 and 31	Very long at neck, half long, pointed root	10	1,700	361	40
2	Mammoth White Intermediate	" 13.	" 23 " 31	Medium size, very well made, pointed root	10	400	340	
3	Improved Short White	" 13.	" 23 " 31	Very large at neck, very well made, half long, pointed root	9	1,350	322	30
4	White Belgian	" 13.	" 23 " 31	Medium length, long root	8	1,300	288	20
5	Half Long Chantenay	" 13.	" 23 " 31	Very well made, half long with rounded root	6	1,500	225	
6	Giant White Vosges	" 13.	" 23 " 31	Medium size, half long, pointed root	4	300	138	20
				Average	8	758	279	18

CARROTS.—Average Yields.

Name of Variety.	1911 Yield.		1912 Yield.		1913 Yield.		Average Yield.	
	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.
Improved Short White	10	1,202	2	1,197	9	1,350	7	1,250
Mammoth White Intermediate	9	118	1	1,547	10	400	7	22
Ontario Champion	7	1,034	1	1,300	10	1,700	6	1,345
White Belgian	9	1,429	1	887	8	1,300	6	1,205
Half Long Chantenay	7	1,497	1	1,052	6	1,500	5	683

SUGAR BEETS.

Three varieties were grown on the same piece of land as the carrots, and they were practically a failure just as in 1911 and 1912.

DIGESTIBLE NUTRIENTS IN DIFFERENT CROPS.

It may be interesting to see how the digestible nutrients compare in the different classes of forage crops at this Station in 1913, and the following tables give the information:—

Kind of Forage Crop.	Number of Varieties tried in 1913.	Pounds of Digestible Nutrients per Acre.		
		Protein.	Carbohydrates.	Fat.
		Lb.	Lb.	Lb.
Turnips	14	415	3,362	83
Corn	7	149	1,773	60
Carrots	6	134	1,294	50
Mangels	11	44	242	9

The varieties which yielded the most in 1913 show the following figures:—

Kind of Forage Crop.	Variety.	Pounds of Digestible Nutrients per Acre.		
		Protein.	Carbohydrates.	Fat.
		Lb.	Lb.	Lb.
Turnips	Hall's Westbury	465	3,767	93
Corn	Ninety Days	196	2,332	78
Carrots	Ontario Champion	174	1,670	65
Mangels	Prize Mammoth Long Red	72	396	14

EXPERIMENTS WITH RED CLOVER AND TIMOTHY.

Two plots of $\frac{1}{250}$ of an acre each of five lots of red clover and four of timothy were sown with the intention of producing strains by natural selection, especially adapted to the province of Quebec. It is hoped that the experiments with red clover also will prove the superiority of home-grown seed in so far that hardier clover strains may be obtained from seed raised in the province than from seed secured from the outside, particularly from more southern localities.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

The season of 1913 was not especially favourable for the growing of forage crops. These crops do best in a moist season, when the rainfall is abundant. A season that is too wet for grain crops, very often suits them admirably. The summer of 1913 was rather dry for the best results even in wheat growing, and consequently crops demanding abundance of moisture were somewhat at a disadvantage.

Field lots of alfalfa gave a very good crop in the first cutting, which was taken off about June 20 to 30. The second cutting, taken off about August 1, suffered much more from drought, and was only a fair crop. Quite a good third crop could have been cut, but it was left for winter protection. A field sown to alfalfa in May produced an excellent catch. This field was in corn in 1912; it was well cultivated that season and the alfalfa was sown on it at the rate of 20 pounds per acre.

Fields of red clover, sown in 1912, wintered in perfect condition and grew thickly. The dry weather made the growth remain short, so that the crop harvested was only fairly good. The same applies to grass crops, and mixtures of grasses and clover.

Good results were obtained with fodder corn this year. The germination was good, and although the seeding was late, as most of the crop was on land that was flooded in May, the growth was rapid and soon made up for the delayed start. A good crop of first-class fodder was harvested.

Root crops were most seriously affected by the shortage of rainfall and were below average in yield. Nevertheless, even in this rather dry season the crop harvested was well worth the labour expended on it.

INDIAN CORN.

Thirteen varieties of fodder corn were grown in uniform test rows. Four rows of each variety were grown, two rows together in one place and two rows in another place, in order to have a duplicate test. The land was sandy loam, summer fallowed in 1912. The corn was planted on May 27, and harvested on September 20. It was quite uninjured by frost when cut. The young plants were considerably injured by soil blowing during a severe windstorm early in June. This delayed them and reduced the yields to quite a degree. One variety of Kaffir corn and one variety of Sugar cane were grown alongside the ordinary corn under the same conditions. The yields are calculated from four rows 681⅓ feet long and 3½ feet apart.

INDIAN CORN FOR ENSILAGE.—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.		Condition when cut.	Weight per acre grown in rows.	
				Ft.	In.		Tons.	Lb.
1	North Dakota White	May 27..	Sept. 20..	6	2	Early dough	18	1,225
2	Compton's Early	" 27..	" 20..	7	4	"	17	900
3	Northwestern Dent	" 27..	" 20..	6	6	Late milk, early dough.	17	300
4	Early Longfellow	" 27..	" 20..	6	1	Early firm dough	15	52
5	Minnesota No. 13	" 27..	" 20..	6	9	Early milk	14	1,700
6	Salzer's North Dakota	" 27..	" 20..	6	3	Late milk, early dough.	14	350
7	Gehu	" 27..	" 20..	4	11	Firm dough, ripe	12	1,775
8	White Cap Yellow Dent	" 27..	" 20..	7	3	Late milk	12	1,500
9	Ninety Days	" 27..	" 20..	7		Early dough	12	1,150
10	Minnesota King	" 27..	" 20..	5	11	Late milk, early dough.	11	1,300
11	Windus White Dent	" 27..	" 20..	5	9	Firm dough, ripe	10	1,560
12	Thayer Yellow Dent	" 27..	" 20..	5	8	Firm dough	9	705
13	Canada Yellow	" 27..	" 20..	4	6	Firm dough, ripe	8	1,850
						Average	13	1,074
	Kaffir Corn	" 27..	" 20..	4	11	Leaves only	13	650
	Sugar Cane	" 27..	" 20..	6	8	Headed out	12	1,450

Northwestern Dent has become the most generally adopted fodder variety for Manitoba. It usually combines a good yield with earliness. This year, it was not so early as some varieties that are usually considered later. Compton's Early and North Dakota White, this year, proved superior not only as to yield as they usually do, but also as to earliness.

Some of the early firm dough varieties, Gehu, Canada Yellow, and Windus White Dent, in particular, produced quite a proportion of ripe ears. The seed of the usual commercial strain of Longfellow failed to germinate, and consequently no test of that variety is reported.

Quebec Yellow, which was reported on so favourably last year and the previous year, had to be omitted from the test this year owing to our failure to obtain seed. Free Press, one of the most promising varieties for grain production, also had to be omitted for the same reason.

FIVE-YEAR AVERAGES.

Only three of these varieties have been grown for five years continuously. Two others have been tested three years, and one for two years. The average results for these periods are as follows:—

Variety.	Average Condition when cut.	Average Yield per Acre.	
		Tons	Lb
Compton's Early	Early milk	20	387
Longfellow	Silk, early milk	18	781
Northwestern Dent	Late milk	16	1,354
North Dakota White (average of 3 years)	Late milk	19	174
Gehu (average of 3 years)	Firm dough	15	500
Minnesota King (average of 2 years)	Early milk	14	1,250

BRANDON.

TURNIPS.

Twenty-two varieties of turnips were tested this year. Four rows of each variety were grown. Each row was 100 feet in length; the distance between rows was 2½ feet. The land was clay loam, and was summer-fallowed the previous year. The season was too dry for the best results. The germination of the seed was not very good and, as a result, the comparison of the varieties is not in all cases as fair as might be desired. The seed was sown May 14, and the crop harvested October 9.

TURNIPS.—Test of Varieties.

No.	Name of Variety.	Description of Variety.	Yield per Acre.		Yield per Acre.	
			Tons.	Lb.	Bush.	Lb.
1	Perfection Purple Top	Purple-top swede, rather flat fairly smooth	19	1,237	653	57
2	New Century	Purple-top swede, medium smooth	19	1,193	653	13
3	Canadian Gem	Purple-top swede, smooth	19	271	637	51
4	Jumbo	Purple-top swede, rather long	18	1,350	622	30
5	Invicta	Purple-top swede, fairly smooth	17	887	587	27
6	Hartley's Bronze Top	Bronze-top swede, rather rough	17	257	570	57
7	Lapland	Bronze-top swede, fairly smooth	16	1,582	559	42
8	Carter's Imperial	Purple-top swede, rough	16	259	537	39
9	Hazard's Improved	Mixed-swedes, rough	15	1,668	527	48
10	Good Luck	Purple-top swede, rather rough	15	972	516	12
11	Mammoth Clyde	Purple-top swede, rather rough	15	755	512	35
12	Bangholm	Purple-top swede, fairly smooth	15	701	511	41
13	Magnum Bonum	Purple-top swede, rather rough	14	1,885	498	5
14	Mammoth Greystone	Purple-top, white flesh (not a swede), fairly smooth	14	1,276	487	56
15	Hall's Westbury	Purple-top swede, fairly smooth	14	580	476	20
16	White Globe	White, round (not a swede), fairly smooth	13	1,362	456	2
17	Elephant	Purple-top swede, very rough	13	461	441	1
18	Halewood's Bronze Top	Bronze-top swede, rough	13	449	440	49
19	Yellow Aberdeen (Green top)	Yellow (not a swede), fairly smooth	12	56	400	56
20	Yellow Aberdeen (Purple top)	Yellow (not a swede), fairly smoo'h	10	1,272	354	32
21	Stubb	White, small, round, (not a swede)	9	1,324	322	4
22	Ostersundom	White flesh, purple-top (not a swede)	8	1,400	290	
		Average	15	145	502	25

The swede turnips are the best suited to Manitoba conditions. The other types do not yield so well and are not as good keepers. Hall's Westbury and Bangholm which are usually among the best yielders, are rather low this year, probably due to faulty germination. Perfection Purple Top is a good reliable variety which again shows up well. Canadian Gem is one of the best of the newer varieties.

AVERAGES.

Six varieties have been grown for five consecutive years. Several others have been grown from two to four years. The average yields obtained for these periods are as follows:—

Variety.		Average Yield per Acre.	
		Tons.	Lb.
Hall's Westbury	(average of 5 years)	23	1,331
Halewood's Bronze Top	"	22	608
Perfection Purple Top	"	22	565
Magnum Bonum	"	21	1,896
Good Luck	"	21	653
Hartley's Bronze Top	"	19	1,999
Bangholm	(average of 4 years)	26	1,534
Mammoth Clyde	"	19	1,127
Jumbo	"	18	880
Elephant	"	18	733
Canadian Gem	(average of 2 years)	29	185
Carter's Imperial	"	23	599
Hazard's Improved	"	22	1,204

MANGELS.

Eleven varieties of mangels were tested in uniform test rows in the same manner as described for turnips. The land was summer-fallowed the previous year, but had some grassy spots that made the test non-uniform. The germination of seed was poor and uneven. As a result of these causes, it was necessary to calculate the yield from parts of rows in many instances. In this way an effort was made to make the test as fair as possible under the circumstances but, even with this precaution, it cannot be considered fully reliable. The seed was sown May 13, and the crop harvested October 4.

MANGELS.—Test of Varieties.

No.	Name of Variety.	Description of Variety.	Yield per Acre.		Yield per Acre.	
			Tons	Lb.	Bush.	Lb.
1	Prize Mammoth Long Red	Red, long, fairly smooth	29	1,812	996	52
2	Giant Yellow Intermediate	Medium long, dark yellow, clean	28	115	935	15
3	Giant Yellow Globe	Yellow, globe, clean, easily pulled	27	514	908	34
4	Gate Post	Red, long, rooty, hard to pull.	27	505	908	25
5	Danish Sludstrup (mixed)	Medium long, dark yellow, clean	27	70	901	10
6	Yellow Leviathan	Medium long, dark yellow, fairly clean	26	678	877	58
7	Perfection Mammoth Red	Red, long, fairly smooth.	26	95	868	15
8	Selected Yellow Globe	Yellow, globe, clean, easily pulled	25	443	840	43
9	Giant Half Sugar White	Medium long, white, fairly clean	25	242	837	22
10	Mammoth Long Red	Red, long, rooty, hard to pull.	19	1,498	658	18
11	Golden Tankard (mixed)	Medium long, reddish yellow.	19	1,346	655	46
		Average	25	1,211	853	31

Prize Mammoth Long Red gives the highest yield both this season and in the five-year average. It is about the smoothest of the long red mangels. This type of mangel is much more difficult to pull than the shorter varieties. The yellow globe varieties are much the easiest type to lift, and are free from roots.

BRANDON.

AVERAGES.

Six varieties have been grown for five consecutive years, one other for four years, and one for two years. The following are the average yields for these periods:—

Variety.	Average Yield per Acre.	
	Tons.	Lb.
Prize Mammoth Long Red (average of 5 years)	29	1,209
Perfection Mammoth Long Red " 5 "	27	1,756
Giant Half Sugar White " 5 "	27	1,164
Giant Yellow Globe " 5 "	26	1,275
Selected Yellow Globe " 5 "	26	902
Giant Yellow Intermediate " 5 "	22	601
Gate Post " 4 "	27	1,624
Golden Tankard " 2 "	28	193

CARROTS.

Six varieties of field carrots were tested in duplicate pairs of rows in the same manner as described for turnips and mangels.

CARROTS.—Test of Varieties.

No.	Name of Variety.	Description of Variety.	Yield per Acre.		Yield per Acre.	
			Tons.	Lb.	Bush.	Lb.
1	Cooper's Yellow Intermediate	Yellow, half long, smooth	12	1,839	430	39
2	Long Orange	Red, long, smooth	12	969	416	9
3	Improved Short White	White, medium long, smooth	11	1,490	391	30
4	White Belgian	White, long, coarse	11	98	368	18
5	Long Red Surrey	Red, long, smooth.	6	1,937	232	17
6	Giant White Vosges	White, long, very coarse	6	1,485	224	45
		Average	10	636	343	56

SUGAR BEETS.

Three varieties of sugar beets were sown on uniform test plots of 500 square feet. The preparation of the soil and subsequent cultivation was similar to that for mangels.

Name of Variety.	Yield per Acre.	
	Tons.	Lb.
Vilmorin's Improved "A"	12	965
Klein Wanzleben	12	30
Vilmorin's Improved "B"	10	70

BRANDON.

EXPERIMENTS WITH GRASSES, CLOVERS, AND ALFALFA.

A series of experimental plots of grasses, clovers, alfalfa, and mixtures was sown in 1911. These plots produced crops in 1912 and have again produced in 1913.

Name of Variety.	Proportion of Parts of Mixture after 2 years from seeding.	Date of first cutting.	Yield per acre, first cutting.	Date of second cutting.	Yield per acre, second cutting.	Total Yield per acre.
			Tons. Lb.		Tons. Lb.	Tons. Lb.
Alfalfa (common)		June 27	2 1,520	Aug. 11	1 520	4 40
Alfalfa (Grimm's)		" "	2 1,800	" "	1 1,200	4 1,000
Alfalfa (Montana)		" "	3 360	" "	1 1,420	4 1,780
Alfalfa (Turkestan)		" "	3 360	" "	1 1,480	4 1,840
Common Red Clover		July 8	2 80	" "		2 80
Mammoth Red Clover		" "	2	" "		2
Alsike		" "	1 840	" "		1 840
White Dutch Clover		Aug. 22	760	" "		760
Brome Grass		July 8	3 40	" "		3 40
Timothy		" "	1 1,320	" "		1 1,320
Western Rye Grass		" "	2 1,120	" "		2 1,120
Kentucky Blue Grass		" "	1,120	" "		1,120
Red Top (mixed with timothy)		" "	1 1,000	" "		1 1,000
Orchard Grass		" "	920	" "		920
Timothy and Red Clover	Timothy 98% Red clover 2%	" "	1 1,160	" "		1 1,160
Timothy and Alsike	Timothy 85%, Alsike 15%	" "	1 1,000	" "		1 1,000
Timothy and Alfalfa	First crop, Timothy 30%, Alfalfa 70%. (2nd crop, practically pure Alfalfa)	" "	2 360	Aug. 22	1 40	3 400
Western Rye Grass and Red Clover	Western Rye Grass 98%, Red Clover 2%	" "	2 120	" "		2 120
Western Rye Grass and Alsike	Western Rye Grass 95%, Alsike 5%	" "	2 560	" "		2 560
Western Rye Grass and Alfalfa	Western Rye Grass 50%, Alfalfa 50%. (2nd crop practically pure Alfalfa)	" "	2 1,480	" "	1,760	3 1,240
Timothy, Western Rye Grass and Red Clover	Timothy 39%, Western Rye Grass 60%, Red Clover 1%	" "	2 200	" "		2 200
Timothy, Western Rye Grass and Alsike	Timothy 36%, Western Rye Grass 60%, Alsike 4%	" "	1 1,880	" "		1 1,880
Timothy, Red Clover and Alsike	Timothy 96%, Red Clover 2%, Alsike 2%	" "	1 1,720	" "		1 1,720
Western Rye Grass, Red Clover and Alsike	Western Rye Grass 100%	" "	1 1,800	" "		1 1,800
Timothy, Red Top and Alsike	Timothy 75%, Red Top 1% Alsike 24%	" "	1 1,520	" "		1 1,520
Timothy, Western Rye Grass, Red Clover and Alsike	Timothy 38%, Western Rye Grass 60%, Red Clover 1%, Alsike 1%	" "	1 1,800	" "		1 1,800
Timothy, Western Rye Grass, Red Clover and Alfalfa	Timothy 29%, Western Rye Grass 35%, Red Clover 1%, Alfalfa 35%. (2nd crop practically pure Alfalfa.)	" "	2	" "	1,480	2 1,480

The most striking feature of the above table is the outstanding superiority of alfalfa over other hay crops, in regard to the quantity of hay produced. Only the plots that had alfalfa, either alone or in a mixture, had any second growth worth cutting. Some of the others made some growth after the showers in September, but that was too late for practical haymaking. The clovers, being biennial, had largely died out at the end of 1912. Most of the plants of clover in this year's crop would be from what seed had ripened and shelled out in one of the previous seasons.

BRANDON.

The greater yielding power of Western Rye grass and Brome grass as compared with the other grasses is quite evident. Western Rye grass is an excellent grass for mixtures. Brome grass is recommended only for light land, as it is too persistent and becomes a weed in rich land.

The notes on the percentage of the different sorts remaining in the mixtures are an interesting record of their relative hardiness and strength. Alfalfa and Western Rye grass stand out easily as the dominant crops.

The plots referred to above have now produced crops in two seasons. In the following table the total yield per acre for the two years is given:—

Variety.	Total Yield per acre 1912 and 1913.	
	Tons.	Lb.
Common Alfalfa	9	540
Grimm's Alfalfa	9	840
Montana Alfalfa	10	680
Turkestan Alfalfa	10	1,060
Common Red Clover	5	1,320
Mammoth Red Clover	5	1,120
Alsike	5	620
White or Dutch Clover	3	320
Timothy	3	1,880
Brome Grass	7	1,960
Western Rye Grass	6	1,520
Kentucky Blue Grass	1	1,280
Red Top	3	960
Orchard Grass	1	1,920
Timothy and Red Clover	5	900
Timothy and Alsike	4	1,920
Timothy and Alfalfa	6	1,200
Western Rye Grass and Red Clover	6	1,360
Western Rye Grass and Alsike	6	1,220
Western Rye Grass and Alfalfa	8	720
Timothy, Western Rye Grass and Red Clover	6	640
Timothy, Western Rye Grass and Alsike	6	520
Timothy, Red Clover and Alsike	5	1,000
Western Rye Grass, Red Clover, and Alsike	6	80
Timothy, Red Top and Alsike	5	300
Timothy, Western Rye Grass, Red Clover and Alsike	5	280
Timothy, Western Rye Grass, Red Clover and Alfalfa	7	40

BRANDON.

ANNUAL HAY CROPS.

A series of plots of crops suitable for the production of a hay crop the same season as sown, were put in this year. They were sown on May 26 on root land. The results obtained are as follows; the yields are of dry hay in each case:—

Name of Crop.	Character of Hay.	Date cut.	Yield per acre.	
			Tons	Lb.
Oats	Good	Aug. 4	6	
Peas and oats	Good	" 4	5	800
Spring rye	Rather coarse	July 18	3	1,200
Millet "Early Fortune"	Very coarse, early	Aug. 4	3	400
Millet "Siberian"	Medium	" 12	3	200
Millet "Japanese"	Very coarse, late	" 12	3	160
Millet "Hungarian"	Medium	" 12	3	
Millet "German"	Coarse, late	" 12	2	1,200
Millet "Common"	Fairly good	" 12	1	1,840

These results would indicate that the common Manitoba practice of using sheaf oats for hay, when regular hay crops are insufficient is probably the best that could be adopted.

16–1915 F. 916.

Red Clover, Indian Head, Sask.

Alfalfa, Indian Head, Sask.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, T. J. HARRISON, B.S.A.

WEATHER CONDITIONS.

On the whole, the weather conditions during the summer of 1913 were excellent for the production of good crops of fodder. While the spring was a little dry for the early growth of pasture grasses, sufficient rain fell during June and early July to stimulate a fair growth before haying commenced. The 4·37 inches of rain that fell in July made it difficult, in many cases, to get the hay well cured. It, however, started the aftermath and good second crops of alfalfa and clover were cut. The fall frosts were late and allowed the corn to become well matured for silage before cutting. The snow and rain in October made it difficult to harvest the roots. These were not a very heavy crop owing to the dry weather in August and September.

INDIAN CORN.

In an all-grain-growing district the big problem is how to control the noxious weeds. Summer-fallowing undoubtedly has its place, but few farmers care to summer-fallow a field two years in succession, which seems to be necessary to eradicate some of our perennial weeds. The problem then is to grow a crop after summer-fallow that will have a cleaning effect, and at the same time produce a revenue. Indian corn allowing inter-tillage seems to be best suited for this purpose. The Farm does not at present pretend to produce grain, but the value of corn as winter fodder is greater than some of the hay crops. To obtain the best results it should be ensiled. This of course necessitates the erection of a silo, and not every person has capital to invest in this manner. They should not, however, delay starting to raise corn for this reason, because good results are obtained by curing the corn in stooks and feeding from the stook. To make the best fodder the plants should be allowed to mature until the grain is glazed. It is better to cut before this stage is reached if there is danger of frost, as frozen corn is of little use for feed. What is required in a variety for southern Saskatchewan is early maturity and high yield of stalk and leaf.

INDIAN CORN.—Test of Varieties.

This test included ten varieties. They were planted on summer-fallow in drills 3 feet apart, at about the rate of 30 pounds of seed per acre. Each variety was sown in duplicate plots consisting each of two rows 72½ feet long, making each plot $\frac{1}{100}$ of an acre in area. The yield was calculated from the average of the two plots.

INDIAN CORN FOR ENSILAGE.—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when cut.	Weight per acre grown in rows.	
				Inches.		Tons	Lb.
1	Ninety Days	May 26	Sept. 15	70	Early milk	18	1,200
2	Early Longfellow	" 26	" 15	84	Late milk	16	600
3	Compton's Early	" 26	" 15	82	Early milk	21	1,800
4	Salzer's North Dakota	" 26	" 15	78	"	9	1,200
5	White Cap Yellow Dent	" 26	" 15	86	Late milk	19	200
6	Canada Yellow	" 26	" 15	36	"	14	800
7	Longfellow	" 26	" 15	72	Early milk	26	1,400
8	Northwestern Dent	" 26	" 15	80	"	18	600
9	Windus White Dent	" 26	" 15	82	"	22	400
10	Thayer's Yellow Dent	" 26	" 15	72	"	20	200
					Average	18	1,420

FIELD ROOTS.

If good results are to be obtained in raising live-stock some succulent food has to be provided for the winter. There is none better than field roots. This season extensive variety tests were carried on with turnips, mangels, sugar-beets, and carrots. Each variety was sown in duplicate test plots of 1/100 acre each.

TURNIPS.

In this test there were twenty-three varieties. They were sown on summer-fallow on May 23, and were pulled on October 8.

TURNIPS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Hall's Westbury	28	600	943	20
2	Magnum Bonum	31	900	1,048	20
3	Hartley's Bronze Top	33	200	1,103	20
4	Halewood's Bronze Top	27	1,000	916	40
5	Perfection Swede	36	1,500	1,225	
6	Good Luck	31	1,500	1,058	20
7	Jumbo	33	900	1,115	
8	Mammoth Clyde	35	200	1,170	
9	Bangholm	32	1,600	1,093	20
10	Lapland	36	800	1,213	20
11	Elephant	20	1,000	683	20
12	Hazard's Improved	29	100	968	20
13	New Century	27	1,400	923	20
14	Canadian Gem	27	200	903	20
15	Carter's Imperial	31	1,900	1,065	
16	Prize Purple Top	29	800	980	
17	Invicta	25	1,700	861	40
18	Yellow Aberdeen, Green Top	22	500	741	40
19	Yellow Aberdeen, Purple Top	29	1,200	986	40
20	Mammoth Greystone	32	1,400	1,090	
21	White Globe	36	1,000	1,216	40
22	Ostersundoia	29	1,400	990	
23	Stubb	33	1,100	1,118	20
	Average	30	1,083	1,018	13

INDIAN HEAD.

MANGELS.

Eleven varieties of mangels were tested in 1/100 acre plots. The rows were 28 inches apart and the roots were thinned out to 8 inches apart in the row. They were planted on May 23, and pulled on October 22.

MANGELS. Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons	Lb.	Bush.	Lb.
1	Giant Yellow Globe	18	1,400	623	20
2	Selected Yellow Globe	13	600	443	20
3	Golden Tankard	10	400	340	
4	Gate Post	28	600	943	20
5	Mammoth Long Red	19	160	640	
6	Perfection Mammoth Red	22	1,800	763	20
7	Prize Mammoth Long Red	19	1,200	653	20
8	Danish Sludstrup	22	1,000	750	
9	Giant Yellow Intermediate	22	1,600	760	
10	Yellow Leviathan	20	400	673	20
11	Giant Half Sugar White	21	800	713	20
	Average	19	1,836	663	56

CARROTS.

Nine varieties of field carrots were under test in 1/100 acre plots. These were planted on May 7, and pulled on October 24.

CARROTS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons	Lb.	Bush	Lb.
1	Ontario Champion	25	1,800	863	20
2	Half Long Chantenay	20	600	676	40
3	Mammoth White Intermediate	21	1,000	836	10
4	Giant White Vosges	18	1,000	616	40
5	White Belgian	26	1,000	883	20
6	Improved Short White	21	1,400	723	20
7	Coopers' Yellow Intermediate	18	1,560	626	40
8	Long Orange	18	1,560	626	40
9	Long Red Surrey	16	1,000	550	
	Average	21	551	709	15

SUGAR BEETS.

Three varieties of sugar beets were planted on May 23, and pulled on October 23.

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Description of Variety.	Yield per Acre.		Yield per Acre.	
			Tons	Lb.	Bush.	Lb.
1	Vilmorin's Improved "A"	Fairly smooth	14	1,870	496	40
2	Vilmorin's Improved "B"	Rooty	12	1,260	420	
3	Klein Wanzleben	Rooty	12	1,200	420	
	Average		13	733	445	33

EXPERIMENTS WITH GRASSES, CLOVERS, AND ALFALFA.

More interest is being taken each year in grasses and clovers. This is largely due, first, to the increased price of live stock enticing more people into this line of farming, and therefore the problem of producing fodder becomes important. Second, in the districts that have been producing wheat year after year, the fields are becoming infested with weeds and the soil depleted in fibre and plant food. As grasses and clovers will help remedy this condition, more of them are being sown each year. The question is often asked, which is the best to sow? Experiments with the different grasses and clovers has been under way on this Farm for a number of years with the following results:—

GRASSES AND RED CLOVER.

Variety.	Year Sown.	Yield in 1913.		Average Yield for Four Years.	
		Tons.	lb.	Tons.	lb.
*Western Rye Grass, Red Clover and Timothy	1907	1	10	1	785
Brome Grass	1899	1	340	1	902
*Western Rye Grass and Red Clover	1904	1	710	1	593
Red Top	1908	1	220	1	929
English Blue Grass	1908		1,760	1	226
Red Clover	1910	1	1,580	1	1,610

* Timothy and clover have practically all killed out in the above plots.

CLOVERS.

As the clovers and alfalfa are the only protein or muscle-building forage crops that can be grown to any extent in the West, and as their renovating effect on the soil becomes better known each year, there are larger numbers inquiring as to which is the best variety to grow. While there is no doubt that alfalfa is best adapted to our conditions, it does not lend itself so readily to a short rotation as do the true clovers.

The question then arises, which of the clovers will thrive the best in our climate. The following gives the result of those most promising:—

Variety.	Yield per Acre.	
	Tons.	lb.
Late Red Clover (from Sweden)	1	1,480
Common Red Clover (from Sweden)	1	760
Alsike (from Sweden)	1	610

ALFALFA.

Alfalfa is recognized the world over as a dry-land plant, but it is only within recent years that it has received much recognition in Western Canada. It was thought for a long time that it was not hardy enough to thrive in the severe climate of the West. Tests that were started some years ago disprove this. The question now

is which variety will give the best results. In the following tables the results are given of experiments with a number of varieties:—

ALFALFA.—Variety test, sown in 1908.

Variety.	1913. Yield per Acre. First Cutting.		1913. Yield per Acre. Second Cutting.		Average Yield Five Years.	
	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.
Grimm	1	1,600	..	1,700	2	1,062
Idaho	1	1,500	1	200	2	1,127
Montana	2	500	1	650	2	1,917
Dryland	2	300	1	1,050	3	626
French Alfalfa	1	1,000	1	600	2	1,730
Turkestan	1	790	.	1,950	2	1,573

ALFALFA.—Test of Varieties, sown in 1909.

Variety.	Condition of Growth.	Yield 1913. First Cut.		Yield 1913. Second Cut.		Total Yield 1913.		Average for Four Years.	
		Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.
Canadian	Poor	..	579	..	1,737	1	316	3	262
Vilmorin's Sand Lucerne	Killed out								
Lecoq's	"								
Mongolian	Partly killed	..	1,544	..	1,737	1	1,281	2	1,875
Nephi Utah (dry land)	Killed out								
Sextorp, Neb.	"								
Alt-Deutsche Frankische	Strong	1	1,088	1	1,667	3	755	3	431
Provence Aubignan	"	1	123	1	1,088	2	1,211	2	1,292
Wessel, Duval Peruvian	Medium	..	1,737	1	123	1	1,860	1	1,471
Baltic	Strong	1	509	1	1,667	3	176	3	884
Wernyj, Turkestan	"	2	53	2	53	4	106	3	1,664
Sand Lucerne (Darmstadt)	"	1	1,274	1	1,956	3	1,230	3	1,780
Chinook, Montana	"	1	1,474	1	123	2	1,597	3	1,351
Liefman's Sand Lucerne	Killed out								
Arabian	"								
Medicago Ruthenica	"								
Medicago Falcata	Strong	1	1,088	1	662	2	1,750	2	1,880
Sand Lucerne, Bromberg	Medium	..	1,544	1	702	2	446	3	769
Thuringian, Erfurt	"	..	1,447	1	1,860	2	1 307	2	1,320
Sand Lucerne, Wissenger	Strong	1	1,351	2	53	3	1,404	3	890
Hungarian, Boschan	Killed								
Pfalzer (Bavarian)	"								
Frasinet (Roumanian)	"								
Vashnin	"								
Belfontaine (Ohio)	Strong	1	702	2	825	3	1,527	2	1,280
Mixed seed	"	1	1,088	2	1,404	4	492	3	1,730
Old Frankish Lucerne	"	1	1,552	2	1,184	4	736	2	440
W. A. Wheeler, No. 162	"	2	440	2	560	4	1,000	3	1,920
No. 240	"	2	80	2	680	4	760	3	1,754
No 164	"	1	1,600	2	140	3	1,740	3	630
No. 167	"	1	880	2	620	3	1,500	2	1,170
Grimm	"	1	1,420	2	548	3	1,968	3	1,840
Montana (23,454)	"	1	880	1	1,720	3	600	2	1,880
No. 25,102	"	1	160	1	1,600	2	1,760	2	1,780
Sand Lucerne (23,394)	Medium	..	1,860	1	1,840	2	1,700	2	330
Canadian (variegated)	Strong	1	280	2	80	3	360	3	1,260
Canadian (purple flowers)	"	1	1,980	2	140	4	120	3	1,550
Turkestan	"	1	160	2	440	3	600	3	1,730

The dry weather during the first of the season which was followed later by wet weather will account for the second cutting being the heavier crop.

INDIAN HEAD.

ALFALFA, SOWN 1910.

Variety.	Remarks.	Yield per Acre. First Cutting.		Yield per Acre. Second Cutting.		Total Yield.	
		Tons.	Lb.	Tons.	Lb.	Tons.	Lb.
Grimm	Strong	1	280	1	736	2	1,016
Turkestan	"	1	160	2	440	3	600

In 1911 a further variety test was started composed principally of the Grimm variety received from different states in the Union, and a few other varieties from Europe. The following table gives the results:—

ALFALFA.

Variety.	Yield per Acre. First Cutting.		Yield per Acre. Second Cutting.		Total Yield.	
	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.
Hungarian Alfalfa (from Hungaria)	2	560	1	1,720	4	280
Grimms "21735" (from Washington)	2	560	1	1,680	4	240
Grimms (from Montana)	2	1,280	2	360	4	1,640
Grimms (from Minnesota)	2	1,040	1	1,600	4	640
Grimms (from Montana)	2	800	2	....	4	800
20th Century (from Wisconsin)	2	200	1	1,240	3	1,440
Sand Lucerne "23187" (from Washington)	2	440	1	773	3	1,213
Sand Lucerne (from Germany)	2	320	1	1,240	3	1,560

FIELD TESTS OF GRASSES, RED CLOVER, AND ALFALFA.

The results of the field tests are as follows:—

FIELD TESTS OF GRASSES, CLOVER, AND ALFALFA.

Kind of Mixture.	Acres in Field.	Year Sown.	Yield per Acre. First Cutting.		Yield per Acre. Second Cutting.		Total Yield per Acre.	
			Tons.	Lb.	Tons.	Lb.	Tons.	Lb.
Western Rye Grass, Alfalfa and Red Clover	5½	1912	1	524	..	....	1	524
Western Rye Grass, Alfalfa and Red Clover	5	1912	1	622	..	....	1	622
Western Rye Grass, Alfalfa and Red Clover	6	1912	1	543	..	....	1	543
Western Rye Grass and Clover	8	1910	1	250	..	..	1	250
Western Rye Grass, Clover and Alfalfa	7	1907	1	297	..	1,965	2	262
Turkestan Alfalfa	½	1907	1	1,100	..	1,980	2	1,080
Montana Alfalfa	2	1908	2	232	1	802	3	1,034

EXPERIMENTAL FARM, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, W. A. MUNRO, B.A., B.S.A.

EXPERIMENTS WITH INDIAN CORN AND FIELD ROOTS.

Eleven varieties of Indian corn, twenty-seven of turnips, eleven of mangels, ten of carrots and three of sugar beets were grown side by side. Each variety was grown in two rows 78 feet long. The ground had been summer-fallowed and manured in 1912. Turnips, mangels, carrots, and sugar beets were sown on May 6 and pulled October 13, while Indian corn was sown on May 10 and harvested September 17. The following tables show the yield per acre of the different varieties under test:—

INDIAN CORN FOR ENSILAGE.—Test of Varieties.

No.	Name of Variety.	Average Height.	Weight per acre grown in rows.	
		Inches.	Tons.	Lb.
1	Longfellow	72	26	600
2	Compton's Early	84	20	110
3	Longfellow	75	20	640
4	Early Longfellow	78	19	1,800
5	Aug. 15th variety	70	18	1,460
6	Canada Yellow	48	18	840
7	North Dakota	74	18	840
8	90 Days	74	18	840
9	White Cap. Yellow Dent	84	15	1,820
10	Windus Yellow Dent	63	15	1,240
11	Thayer White Dent	66	9	1,420
	Average		18	646

Turnips.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Perfection	46	1,800	1,563	20
2	Hazward's Improved	45	1,800	1,530	
3	Hall's Westbury	45	920	1,515	20
4	Invicta	43	1,320	1,455	20
5	Prize Purple Top	42	1,760	1,429	20
6	Mammoth Clyde	42	1,540	1,425	40
7	Canadian Gem	41	200	1,370	
8	Good Luck	41	200	1,370	
9	Hall's Westbury	41	200	1,370	
10	Hallwood's Bronze Top	40	1,740	1,362	20
11	Lapland	40	1,300	1,355	
12	Magnum Bonum	39	840	1,314	
13	Bangholum	39	840	1,314	
14	Carter's Imperial	39	180	1,303	
15	Hartley's Bronze Top	38	1,720	1,295	20
16	Green Top	38	1,720	1,295	20
17	New Century	38	1,280	1,288	
18	Jumbo	38	1,060	1,284	20
19	Mammoth Grey Stone	36	1,700	1,228	20
20	Yellow Aberdeen (Green Top)	36	820	1,213	40
21	White Globe	36	140	1,202	20
22	White Swede	34	1,240	1,154	
23	Cow Horn	33	560	1,109	20
24	Yellow Aberdeen (Purple Top)	32	540	1,075	40
25	Stubb	26	1,400	890	
26	Elephant	24	180	803	
27	Ostersundom	16	1,720	562	
	Average	37	1,730	1,262	10

Mangels.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Selected Yellow Globe	38	1,720	1,295	20
2	Giant Half Sugar White	35	1,240	1,187	20
3	Giant Yellow Intermediate	35	1,240	1,187	20
4	Giant Yellow Globe	34	800	1,146	40
5	Danish Sludstrup	34	800	1,146	40
6	Prize Mammoth Long Red	33	1,220	1,120	20
7	Gate Post	32	100	1,068	20
8	Perfection Mammoth Red	29	1,860	997	40
9	Yellow Leviathan	29	1,640	994	
10	Golden Tankard	25	920	848	40
11	Yellow Globe	16	280	538	
	Average	31	893	1,048	13

CARROTS.—Test of Varieties.

No.	Name of Variety	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Improved Short White	14	280	471	20
2	Ontario Champion	12	1,280	421	20
3	Long Red Surrey	12	680	411	20
4	Cooper's Yellow Intermediate	11	180	369	40
5	Long White Belgian	10	1,180	353	
6	Mammoth White Intermediate	9	200	303	20
7	Half Long Chantenay	8	520	275	20
8	Long Orange	8	500	275	
9	Long Red Surrey	6	460	207	40
10	Giant White Vosges	5	160	169	20
	Average	9	1,544	325	44

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Improved Vilmorin A	16	1,060	551	
2	Improved Vilmorin B	12	1,000	416	40
3	Klein Wanzleben	12	340	405	40
	Average	13	1,467	457	47

SEEDING TO GRASSES AND CLOVERS.

An experiment has been under way for three years on methods of seeding to grasses and clovers. In each case the quantities of seed sown per acre are the same, viz., 10 pounds Rye grass seed, 3 pounds Alfalfa, and 3 pounds Red Clover. The difference in the various methods was the kind of crop preceding the sowing of the grass seed, and the kind of crop the grass seed was sown with as a nurse crop, if any was used. The first table shows the yields from seeding in 1911 on land that had been cropped to peas in 1910, and the hay in 1912 and 1913. The second table gives a duplicate of these experiments begun in 1911 with the seeding down in 1912 and the first hay crop in 1913. It also shows the various treatment of the land before seeding:—

1911.	1912.		1913.	
	Tons	Lb.	Tons	Lb.
Seeded with wheat	2	200	2	1,320
" alone	2	1,080	2	440
" with wheat	2	160	2	1,320
" alone	2	1,040	2	440
" with wheat	2	400	2	840
" alone	2	680	2	640
" with oats	1	1,400	2	480
" alone	2	1,080	1	1,760
" with wheat	1	1,920	ploughed up	
" alone	2	1,800	"	
" with wheat	1	1,640	1	1,535

SEEDING TO GRASSES AND CLOVERS—*Concluded.*

1911.	1912.	1913. Tons	Lb.
Summer-fallow	Seeded with wheat	3	1,560
"	" alone	4	1,520
Hoed crop	" with wheat	4	120
"	" alone	3	1,840
Wheat	" with wheat	2	400
"	" alone	3	40
"	" with oats	1	1,960
"	" alone	3	400
"	" with wheat	2	360
Oats	" alone	3	40
Wheat	" with wheat	2	250

An experiment cannot be considered as conclusive until it has been carried on successively for a number of years, but at the present it seems fairly safe to conclude that better results are obtained by seeding alone than by seeding with a nurse crop.

On the other hand it must be pointed out that by sowing with a nurse crop an extra grain crop is obtained, which would be lost by seeding down to hay without it.

In both experiments recorded above the hay crop was rather light when oats were used as a nurse crop. Similar results have been obtained from large areas.

The experience gained so far at the Station tends, however, to prove that it is not the nature of the nurse crop, but the absence or presence of the same that influences the hay crop. A nurse crop, whether it be oats, barley, or wheat, is apt to be so heavy as to lodge and thus smother the young grass. For example, very poor success had been recorded at the Station by sowing to hay with barley on summer-fallow. The barley grows so rank that it lodges and smothers the young grass. On stubble land, however, barley will no doubt prove to be the most satisfactory nurse crop.

Besides the regular experimental work in seeding to grasses and clovers, the following are the results obtained on larger areas: One 2-acre plot sown to wheat in 1911 and seeded down with oats in 1912 yielded at the rate of 1 ton and 671 pounds per acre in 1913, and a plot sown alone in 1911 yielded 2 tons 768 pounds per acre in 1912 and 1 ton 1,950 pounds per acre in 1913.

Another 2-acre plot sown to wheat in 1911 and seeded down with oats in 1912 yielded 1 ton 285 pounds per acre in 1913, and another plot seeded alone in 1911 yielded 2 tons 1,984 pounds in 1912, and 1 ton 335 pounds per acre in 1913.

A 2-acre plot seeded alone in 1912 yielded at the rate of 1 ton 1,921 pounds in 1913.

In 1912 the Rye grass from 2 acres was allowed to ripen, and after threshing it and fanning the seed 1,030 pounds of clean good Rye grass seed was obtained from the 2 acres. This was worth 15 cents per pound locally.

The question is frequently asked what kind of grass gives the best crop.

So far, Timothy, Western Rye grass and English Rye grass have been tested at the Station.

The results of the experiments show that English Rye grass does not stand the winter and that the Western Rye grass is superior to timothy as far as yield is concerned and of about the same quality.

About 15 pounds of good Rye Grass seed to the acre gives the best yield.

Summarizing the above, the Station holds that Western Rye grass is the most satisfactory hay crop. The extra yield obtained by seeding alone does not make up for the loss of a grain crop by seeding with a nurse crop, providing the nurse crop is of such a nature as not to smother the young grass plants.

ROSTHERN.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE SUPERINTENDENT, R. E. EVEREST, B.S.A.

The season was not favourable for large yields. During the early period of growth the weather was somewhat cool and the rainfall light. The intermediate period had a moderate precipitation with fairly high temperatures, and the closing time of growth was light in rainfall and moderate in warmth for the time of year.

RECORDS for Periods.

Period.	Maximum temperature	Minimum temperature	Mean temperature	Precipitation.	Sunshine.
	°	°	°	Inches.	Hours.
1 May and June	87·5	23·4	51·2	1·2	233 4
2 July and August	86·7	34 7	59·9	2·8	260 5
3 September and October	79·0	7·3	42·1	·8	185·7

INDIAN CORN.

Eight varieties of corn were planted on May 21 in hills 36 inches apart each way on land which had been summer-fallowed the previous year. The seed germinated and made a slow growth for a time. At the cutting time the crop had failed to reach a stage where it was of value for fodder purposes. The character of the season (particularly the cool nights) generally militates against the success of Indian corn here.

With the breaking-up of more prairie land and with more thorough cultivation generally, there is no doubt, however, that the conditions will be improved so as to better answer the requirements of Indian corn. Even so, only early varieties can be thought of for reliable crops.

FIELD ROOTS.

Three main groups of field roots were grown this year, viz., turnips, mangels, and carrots. As well as to demonstrate the possibility of growing these crops successfully, a number of varieties in each class were grown to determine the relative merits of the different varieties commonly used.

The seed was sown on the flat with a hand drill, the rows at a distance of 28 inches and a length of 92¾ feet. Four rows were used for each variety, from which the weight of crop was taken and the acre-yield computed. The area of each plot was $\frac{1}{50}$ of an acre.

The soil on which the work was conducted was a chocolate loam, fairly uniform throughout the field.

The land had been summer-fallowed the previous year and before sowing was double disced, drag harrowed, and packed.

Thus the bed was firm and in good tilth for the reception of seed.

TURNIPS.

Twenty-one varieties of turnips were sown on May 21. The seed germinated well and produced a uniform stand of plants. The rows were thinned out on June 27 and 28, leaving the plants 12 inches apart. Throughout the season, cultivation with hoe and scuffler was given to keep the crop clean and the soil in good tilth.

The resulting crop as harvested on the 16th to 18th of October was of average size, roots good in quality and of a moderate total yield. The turnips were not seriously attacked by any pest or disease, and throughout their time of growth maintained a healthy thriving condition.

TURNIPS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Mammoth Greystone	27	250	904	10
2	White Swede	26	500	875	.
3	Magnum Bonum	22	750	745	50
4	Invicta	21	1,000	716	40
5	Halewood's Bronze Top	21	800	713	20
6	Hartley's Bronze Top	21	..	700	..
7	Yellow Aberdeen (Green Top)	19	1,200	653	20
8	Cow Horn	19	1,000	650	..
9	Carter's Imperial	18	1,000	616	40
10	Perfection	17	1,250	587	30
11	Canadian Gem	17	1,000	583	20
12	Good Luck	17	1,000	583	20
13	Hazard's Improved	17	1,000	583	20
14	Prize Purple Top	17	1,000	583	20
15	Yellow Aberdeen (Purple Top)	17	..	566	40
16	Green Top	15	1,800	530	..
17	Jumbo	14	.	466	40
18	Mammoth Clyde	13	1,500	458	20
19	New Century	13	1,000	450	..
20	Halls Westbury	13	750	445	50
21	Bangholm	13	500	441	40
22	Lapland	12	..	400	..
23	Elephant	11	1,000	383	20
24	White Globe	6	1,000	216	40
	Average	19	1,586	659	46

MANGELS.

Ten varieties of mangels were sown May 22 on fallowed land. The seed was sown in drills 30 inches apart, and on June 28 the young plants were thinned to 12-inch spaces in the row. Necessary cultivation was given, and from the 13th to the 15th of October, a crop of good quality though somewhat below a fair average as to yield, was harvested.

The mangels were not seriously molested by pests nor were they affected by disease.

MANGELS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	lb.	Bush.	lb.
1	Selected Yellow Globe	16	750	545	50
2	Giant Yellow Globe	13	1,250	454	10
3	Prize Mammoth Long Red	13	....	433	20
4	Giant Yellow Intermediate	12	1,250	420	50
5	Danish Sludstrup	12	1,000	416	40
6	Yellow Leviathan	12	..	400	
7	Gate Post	11	1,750	395	50
8	Mammoth Long Red	11	....	366	40
9	Golden Tankard	10	1,750	362	30
10	Perfection Mammoth Red	10	1,250	354	10
	Average	12	900	415	

CARROTS.

Eight varieties of carrots were sown on May 22. The plants were thinned to 6-inch spaces in the row. The land was cultivated from time to time to keep down weeds, and maintain a favourable condition of soil. The crop was harvested from the 11th to the 14th of October.

The low yield is due to the work of gophers and rabbits, which did great damage, especially to the young plants, preventing them from developing properly.

CARROTS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	lb.	Bush.	lb.
1	White Belgian	2	1,250	87	30
2	Ontario Champion	2	950	82	30
3	Giant White Vosges	2	600	76	40
4	Half Long Chantenay	2	550	75	50
5	Improved Short White	2	500	75	
6	Mammoth White Intermediate	2	500	75	
7	Cooper's Yellow Intermediate	1	1,950	65	50
8	Long Red Surrey	1	1,400	56	40
9	Long Orange	1	1,250	54	10
	Average	2	869	81	9

RED CLOVER.

This spring an experiment with Red Clover was laid out in order to try to secure a type suitable to northwestern Saskatchewan. Ten different lots of Red clover seed obtained through the Central Experimental Farm from seedsmen and private growers in Eastern Canada were sown in twenty small plots. Each sample of seed sowed two plots. The plots in one range were sown for the purpose of hay production. The plots in the second range were sown for the purpose of seed production. The experiment has a twofold object in view, first, to produce a suitable hardy variety of Red clover, and second, to prove the value of home grown seed.

ALFALFA.

An effort is being made to get an area 1 acre in extent established for the production of alfalfa as a hay crop. Deep cultivation was given by using a subsoil hook on the plough. After further preparation for a good seed-bed, two varieties of alfalfa were sown, viz., Grimm and Turkestan, the date of seeding being May 26. With the Grimm alfalfa a test of inoculation treatment was also undertaken, the land seeded with this variety was divided into three parts. On one division seed treated with nitro-culture obtained from the Ontario Agricultural College was used, on a second division no treatment of seed or soil was given, and on the third division inoculated soil obtained from the Experimental Farm, Indian Head, was sown. At the conclusion of the growing season the top growth of the crop was of average appearance, and from the foliage no marked difference between the areas seeded to Grimm alfalfa could be seen.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

The rainfall during the spring of 1913 being light, in fact extremely scant during the latter part of May and the first half or more of June, the yield of most forage crops on the dry land was correspondingly light. The dry weather naturally did not affect the crops materially on the irrigated part of the Station.

The investigations with forage plants were carried on as usual both on dry land and on irrigated land. The experiments on the dry, or non-irrigated land, are located a good distance away from, and above, the main canal to avoid possibility of seepage. The crops experimented with on the irrigated land are irrigated in such a manner and at such time as to get the best results possible.

To avoid any confusion the report is divided into two parts. The first deals with experiments conducted on the part of the farm on which no irrigation is applied. The second part deals with experiments carried out under irrigation.

PART I.—NON-IRRIGATED OR "DRY FARM."

INDIAN CORN.

Corn has done better than usual this season. Some varieties, such as Northwestern Dent, Canada Yellow, and Longfellow ripened a few ears. Nine varieties were tested. They were planted May 15 on summer-fallow in rows 3 feet apart. Each variety was grown in a plot of 1/48 of an acre. They were all cut September 8. The character of the soil was a chocolate sandy loam.

INDIAN CORN.—Test of Varieties.

No.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition When Cut.	Weight per acre grown in rows.	
			Inches.			Tons.	Lb.
1	Ninety Days	Erect	66	4	Late milk	11	1,064
2	Compton's Early	Tillers freely	63	10	Early milk	11	178
3	Longfellow	Tillers freely	60	10	Early milk	10	520
4	Early Longfellow	Tillers freely	56	10	Silk	9	1,248
5	Canada Yellow	Low and branching	42	9	Late milk	8	176
6	Salzer's North Dakota	Tillers freely	63	10	Early milk	7	1,264
7	Windus Yellow Dent	Erect	63	4	Late milk	6	72
8	Thayer White Dent	Erect	60	4	Late milk	5	656
9	Squaw	Low and branching	32	8	Almost ripe	4	1,024
					Average	8	467

TURNIPS.

Twelve varieties of turnips were sown on summer-fallowed land on May 20, and pulled October 6. They were sown in rows 28 inches apart and thinned to about 10 or 12 inches apart in the rows.

TURNIPS.—Test of Varieties.

No.	Variety.	Yield per acre.			
		Tons.	Lb.	Bush.	Lb.
1	Good Luck	20	1,307	688	27
2	Perfection	19	465	641	5
3	Hartley's Bronze Top	18	211	603	31
4	Hall's Westbury	17	1,819	596	59
5	Magnum Bonum	17	692	578	12
6	Lapland	17	153	569	13
7	Bangholm	16	1,675	551	15
8	Prize Purple Top	16	536	542	16
9	Jumbo	16	340	539	
10	Mammoth Clyde	15	233	503	53
11	Mammoth Greystone	14	1,449	490	49
12	Halewood's Bronze Top	13	1,734	462	14
	Average	16	1,835	563	55

LETHBRIDGE.

Flood Irrigating Alfalfa. Lethbridge.

First cutting of Alfalfa on irrigated land. Lethbridge, Alta.

16—1915—p. 932.

MANGELS.

Eleven varieties of mangels were sown on summer-fallow May 7, and pulled on October 17. They were sown in rows 28 inches apart and thinned to about 10 to 12 inches apart in the rows. The size of the plots from which the yields were computed were each 1/100 of an acre.

MANGELS.—Test of Varieties.

No.	Variety.	Character of growth.	Yield per acre.			
			Tons.	Lb.	Bush.	Lb.
1	Gate Post	Heavy tops...	24	425	807	5
2	Selected Yellow Globe	Small tops....	21	1,775	729	35
3	Giant Half Sugar White	Medium tops..	21	675	711	15
4	Danish Sludstrup	Heavy tops...	19	1,575	659	35
5	Giant Yellow Intermediate	Heavy tops...	19	1,475	657	55
6	Giant Leviathan	Medium tops..	19	1,425	657	5
7	Perfection Mammoth Long Red	Heavy tops...	18	1,100	618	20
8	Giant Yellow Globe	Small tops....	17	1,750	595	50
9	Prize Mammoth Long Red	Heavy tops...	17	1,425	590	25
10	Mammoth Long Red	Heavy tops...	15	1,125	518	45
11	Golden Tankard	Medium tops..	14	1,525	492	5
		Average..	19	389	639	49

CARROTS.

Nine varieties were sown on summer-fallow on May 7, and pulled October 10. They were sown in rows 28 inches apart and the plants were thinned to 6 or 8 inches apart in the rows. The size of each plot from which the yield was computed was 1/8 of an acre.

CARROTS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons	Lb.	Bush.	Lb.
1	Mammoth White Intermediate	11	516	375	16
2	Improved Short White	10	1,903	365	3
3	Cooper's Yellow Intermediate	9	1,355	322	35
4	Ontario Champion	9	1,600	326	40
5	Half Long Chantenay	8	1,542	292	22
6	Long Red Surrey	7	1,827	263	47
7	White Belgian	8	856	280	56
8	Long Orange	7	63	234	23
9	Giant White Vosges	6	1,500	225	..
	Average	8	1,907	298	27

SUGAR BEETS.

Four varieties were sown on summer-fallow on May 10, and dug October 11. They were sown in rows 28 inches apart and the plants were thinned to 6 to 8 inches apart in the rows. The area of each plot from which the yields were computed was 1/8 of an acre.

LETHBRIDGE.

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons	Lb.	Bush.	Lb.
1	Raymond No. 2358	12	1,505	425	5
2	Vilmorin's Improved "B"	12	498	408	18
3	Vilmorin's Improved "A"	9	743	312	23
4	Klein Wanzleben	10	1,144	352	24
	Average	11	473	374	33

MILLETS.

Millets as a rule have not yielded particularly well at this Station. It appears that the land must be carefully prepared or otherwise the crop will be light. On stubble or fresh broken sod it produces very little indeed. It has been found that the only way to get a satisfactory yield is to sow them on summer-fallow. The following table gives the results of seven varieties sown on summer-fallow in plots of 1/20 acre each.

MILLETS.—Test of Varieties.

Variety.	Date Sown.	Date Cut.	Yield Per Acre in 1913.		Average Yield per acre for Two Years.	
			Tons.	Lb.	Tons.	Lb.
Siberian	May 5	Aug. 6	3	1,000	3	1,500
Hungarian	" 5	" 6	3	600	3	300
Common	" 2	" 6	1	200	2	950
Hog	" 2	July 30	2	100	2	850
German	" 2	Aug. 6	1	...	2	400
Early Fortune	" 5	July 24	1	1,200	1	1,700
Japanese	" 2	Aug. 6		1,200	1	750

PERENNIAL HAY CROPS.

One of the most difficult problems confronting the dry land farmer in the drier parts of southern Alberta is the question of raising some kind of profitable hay or pasture crop.

By the use of summer-fallow, whereby storing of a certain amount of moisture in the subsoil is effected it is possible to raise profitable crops of grain in medium dry seasons. Thus, the safest means to obtain feed, would be to cut grain green. This is, however, expensive as it entails the necessity of ploughing and seeding for each crop raised.

In the case of a perennial crop, conditions are quite different. A perennial crop keeps on growing during the summer and late into the fall using up all the available moisture. In the spring when it continues its interrupted growth, there is therefore no reserve moisture in the subsoil to draw on, and to tide it over the dry periods. The perennial crop has consequently to depend entirely on the rains that come during its growing period.

LETHBRIDGE.

The efforts made by the Station during a number of years to overcome the difficulty of raising profitable perennial hay crops on non-irrigated land have so far resulted in the development of a method which seems to be promising. The principle of this method is simply to plant the hay crops in rows and cultivate.

By growing the hay crops in rows a sufficient distance apart, the stand will be much thinner than if the seed is sown broadcast or in drills close together, but as the amount of moisture and nourishment awarded the plants in the rows is larger, the crop generally grows high enough to allow cutting. The cultivation also produces a mulch which aids in conserving the moisture. It also prevents weed growth.

There appear, at the present time, to be only three permanent forage crops worth considering, for dry land farms. They are Alfalfa, Western Rye grass, and Awnless Brome grass.

Of these, alfalfa no doubt is the superior one.

Western Rye being of a bunch grass nature and not inclined to make a thick sod is better for hay than is Brome grass. It should be cut soon after it heads out; otherwise, it is apt to become woody and unpalatable to stock.

For pasture, Awnless Brome grass is superior, it being of the same nature as couch or twitch grass, *i.e.*, spreading from underground root stalks. It is, however, difficult to eradicate.

This is especially true on rich, moist soils where it is really a most serious pest when it once has established itself.

ALFALFA IN ROWS.

On account of the reasonably good success obtained on the Station by growing alfalfa in rows, both for hay, but more particularly with the object in view of raising seed, quite a few farmers in the district are beginning to sow small areas in this way. It has been found advisable not to have the rows much less than 30 inches apart if grown for hay. If seed is to be raised, 3 feet or possibly 3½ feet apart is probably better.

In view of the fact that an increasing interest is being taken by many farmers in the question of sowing alfalfa in rows for the production of seed it might be well to call attention to the importance of starting with seed of the Grimm variety or some other equally hardy strain. Although, in the Lethbridge district, practically all varieties of alfalfa seem to be sufficiently hardy, it must be kept in mind that this is not the case in other districts in the province of Alberta. Consequently, from a general point of view, the importance of producing seed only from the strains that have proven to be particularly hardy is quite apparent.

The yield of seed is always uncertain as it is governed to quite a great extent by climatic conditions at the time the seed pods are forming. This year our yield of seed was light, averaging only about 70 pounds per acre.

Seed selection in a small way has been begun by collecting seed from a few individual plants that seem to possess the most desirable qualities, *i.e.*, earliness, leafiness, an upright growth, and a free-blooming character. Rows from the seed of individual plants collected in 1912 were planted the following spring and the plants were thinned out to three feet apart each way. Seed was collected this season for further work along this line next year.

MIXTURES FOR PERMANENT PASTURE.

A large number of small plots were laid out and planted in 1912 with different grasses and clovers and with various mixtures of the same. These were cut during the summer as often as the growth was a few inches high and a record was kept of the yield in each case. As this record is for one season only, another year's work will be required before it will be of much value.

LETHBRIDGE.

PART II—THE IRRIGATED FARM.

As would be expected, the yields from the corn roots and hay were all much heavier on the irrigated than on the non-irrigated land.

INDIAN CORN.

As on the dry land the corn was raised with the object in view of producing ensilage.

Eight varieties were tested. They were planted May 15 on stubble land that had been manured the previous fall and were all cut September 8. The rows were 3 feet apart. The yield was computed in each case from a plot 1/30 of an acre in size. They were irrigated once on July 24.

INDIAN CORN.—Test of Varieties.

No.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per acre.	
			Inches.			Tons.	Lb.
1	Compton's Early	Tall and tillered	76	8·5	Late milk	15	1,278
2	Early Longfellow	Medium and tillers	72	8·5	In silk	14	1,913
3	Longfellow	Tall and tillers	73	8	Late milk	14	41
4	Salzer's North Dakota	Medium and tillers	72	8·5	Doughy	13	1,810
5	Ninety Days	Erect	74	8·5	"	11	854
6	Canadia Yellow	Short and tillered	50	6	"	10	417
7	Windus Yellow Dent	Erect	68	8	"	9	915
8	Thayer's White Dent	Erect	68	7	Late milk	7	1,308
	Average					12	317

TURNIPS.

Twelve varieties of turnips were sown May 10 on stubble land, manured the previous fall and pulled October 16. They were sown in rows 28 inches apart and thinned to about 10 or 12 inches apart in the rows and were irrigated on July 24. The size of the plots from which the yield was computed was 1/100 of an acre.

TURNIPS.—Test of Varieties.

No.	Variety.	Yield Per Acre.			
		Tons.	Lb.	Bush.	Lb.
1	Mammoth Greystone	39	1,000	1,316	40
2	Perfection	35	1,000	1,183	20
3	Good Luck	33	1,500	1,125	..
4	Magnum Bonum	32	1,000	1,083	20
5	Hartley's Bronze Top	32	500	1,075	..
6	Bangholm	31	1,750	1,062	30
7	Mammoth Clyde	31	1,000	1,050	..
8	Lapland	31	500	1,041	40
9	Hall's Westbury	30	500	1,008	20
10	Prize Purple Top	29	750	979	10
11	Jumbo	23	1,500	958	20
12	Halewood's Bronze Top	20	1,000	683	20
	Average	31	833	1,047	13

LETHBRIDGE.

MANGELS.

Eleven varieties of mangels were sown on stubble land, manured the previous fall, on May 5 and pulled September 26. They were sown in rows 28 inches apart and thinned to about 10 or 12 inches apart in the rows. The size of the plots was 1/100th of an acre each. They were irrigated on July 24.

MANGELS.—Test of Varieties.

No.	Variety.	Yield per Acre.			
		Tons.	Lb.	Bush.	Lb.
1	Gate Post	24	1,425	823	45
2	Selected Yellow Globe	21	1,725	728	45
3	Giant Half Sugar White	21	675	711	15
4	Danish Sludstrup	19	1,575	659	35
5	Yellow Yellow Intermediate	19	1,425	657	5
6	Yellow Leviathan	19	1,425	657	5
7	Perfection Mammoth Long Red	18	1,100	618	20
8	Giant Yellow Globe	17	1,750	595	50
9	Prize Mammoth Long Red	17	1,425	590	25
10	Mammoth Long Red	15	1,125	518	45
11	Golden Tankard	14	1,525	492	5
	Average	19	470	641	10

CARROTS.

Ten varieties of carrots were sown May 7 on stubble land, manured the previous fall, and were pulled October 10. They were sown in rows 28 inches apart and the plants were thinned to about 6 or 8 inches apart in the rows. The size of the plots was 1/80th of an acre each. They were irrigated July 24.

CARROTS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons	Lb.	Bush.	Lb.
1	Ontario Champion	17	1,084	584	44
2	Mammoth White Intermediate (C.E.F)	17	888	581	28
3	Cooper's Yellow Intermediate	16	1,173	552	53
4	White Belgian	18	1,142	619	2
5	Giant White Vosges	13	1,342	455	42
6	Long Orange	12	598	419	58
7	Half Long Chantenay	13	1,661	461	1
8	Long Red Surrey	11	393	373	13
9	Improved Short White	14	1,866	497	46
10	Mammoth White Intermediate	11	1,888	398	8
	Average	14	1,601	493	24

LETHBRIDGE.

SUGAR BEETS.

Four varieties were sown May 10 on stubble land, manured the previous fall, and were pulled October 13. They were sown in rows 28 inches apart and the plants were thinned to 6 or 8 inches apart in the rows. The area of each plot was 1/98 of an acre. They were irrigated July 24, and again on September 30.

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons	Lb.	Bush.	Lb.
1	Klein Wanzleben	13	166	436	6
2	Vilmorin's Improved "A"	15	674	511	14
3	Vilmorin's Improved "B"	14	861	481	1
4	Raymond No. 23 8	12	1,735	428	55
	Average	13	1,859	464	19

ALFALFA.

The acreage of alfalfa on irrigated lands in the province is increasing rapidly from year to year as the importance and value of this crop is better appreciated by the farmers. It has been grown successfully in the Lethbridge district for the past dozen years. The total acreage now well exceeds 10,000 acres. On the Canadian Pacific Railway Company's irrigated lands in the Strathmore and Gleichen districts it is being introduced more slowly. Everything indicates, however, that it can be profitably raised there, provided care is exercised in ascertaining the source of the seed so that only hardy types are used, and proper cultural operations in the manner and time of irrigation are employed.

Alfalfa is peculiarly adapted to irrigation. It produces large crops each year and owing to the fact that a stand will last for many years after it is sown, it is very profitable there being no expense attached to it except irrigating and harvesting the crop.

To get the best results the land should be irrigated for each crop or cutting. The yield depends entirely on the care exercised in irrigating, that is, no parts of the field should be missed and no parts over-irrigated sufficiently to injure the crop. In this connection it must also be mentioned that, according to reports in the spring of 1914, fall irrigation is not a safe practice in all districts.

The average yield per acre on the Station since 1909 (the first fields were sown in 1908) of field-cured hay has been just a little over 5 tons per acre.

Some tests have been made to ascertain the best quantity of seed to sow. The results obtained are given in the following tables. The plots were all sown alone, no nurse crop of grain being used.

The Station recommends using from 15 to 20 pounds of seed per acre. If conditions are very favourable, *i.e.*, if good rains come just after the seed is sown, less will do, but as it is a crop that will remain a long time on the land and one that will not thicken but rather is apt to become thinner as it becomes older, a liberal supply of seed is usually true economy. The hay from a thick stand has finer stems and so is better in quality.

LETHBRIDGE.

EXPERIMENT with Rates of Seed per Acre of Alfalfa (Irrigated) Sown in 1912.

Rate of Seed per Acre.	Size of Plot.	Yield per Acre, First Cutting.		Yield per Acre, Second Cutting.		Yield per Acre, Third Cutting.		Total Yield per Acre.	
Lb.	Acres	Tons	Lb.	Tons	Lb.	Tons	Lb.	Tons	Lb.
5	·05	1	180	1	460	..	1,120	2	1,880
10	·49	1	643	1	928	..	1,204	3	775
15	·46	1	543	1	1,130	..	1,000	3	673
20	·43	1	465	1	814	..	976	3	255
25	·34	1	985	1	1,617	..	926	3	1,529

EXPERIMENT with Rates of Seed per Acre of Alfalfa (Irrigated).—Size of plots Half an Acre. Sown in 1911.

Rate of Seed per Acre.	Yield per Acre, First Cutting.		Yield per Acre, Second Cutting.		Yield per Acre, Third Cutting.		Total Yield per Acre for 1913.		Total Yield per Acre for two Years *	
Lb.	Tons	Lb.	Tons	Lb.	Tons	Lb.	Tons	Lb.	Tons	Lb.
5	2	410	1	1,120	..	1,080	4	610	6	1,450
10	2	1,160	1	1,660	..	1,320	5	140	7	1,240
15	2	1,090	1	1,960	..	1,340	5	390	7	1,750
20	2	1,210	1	1,800	..	1,490	5	500	8	180
25	2	720	1	1,890	..	1,160	4	1,770	7	1,670

*In the year of 1912 only two cuttings were taken.

VARIETY TESTS OF ALFALFA.

In the spring of 1909, seed of fourteen varieties or strains of alfalfa was planted that was received from the United States Department of Agriculture, Washington, D.C. This was supplied by the courtesy of Mr. J. M. Westgate, Agronomist, Division of Forage Crop Investigations. The following table gives the results for the season:—

VARIETIES of Alfalfa.

Size of Plot.	—	June 9, 1913. First Cutting Yield per Acre.		July 28, 1913 Second Cutting Yield per Acre.		Sept. 10, 1913 Third Cutting Yield per Acre.		Total for 1913. Yield per Acre.		Average Yield per Acre for 4 Years.	
Acres		Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.	Tons.	Lb.
1–40	23203 From Wernyj, Turkestan..	2	1,000	2	400	1	1,600	6	1,000	5	1,750
1–10	24859 Kansas Hardy	1	750	1	1,450	1	1,550	4	1,750	5	1,658
1–10	24837 Canadian (Variegated)	1	1,040	1	1,850	1	1,600	5	490	5	1,558
1–10	Turkestan from Ottawa	2	300	1	1,500	1	950	5	1,750	5	1,488
1–40	22788 From Aulie-ata, Turkestan..	2	600	3	...	1	800	6	1,400	5	1,430
1–10	23454 Montana	1	1,400	1	1,550	1	1,500	5	450	5	1,230
1–10	23394 Sand Lucerne	1	1,350	1	1,050	1	1,200	4	1,600	5	563
1–40	22790 From Kiva, Turkestan	1	1,200	2	200	1	...	4	1,400	5	550
1–40	22789 From Tschimkent Turkstan.	2	...	2	...	1	1,400	5	1,400	5	190
1–10	21032 Turkestan	1	1,900	1	1,300	1	850	5	50	4	1,995
1–10	25102	1	650	1	1,600	1	1,050	4	1,300	4	1,975
1–40	25022 Old Frankish Lucerne ..	1	1,800	2	600	1	1,200	5	1,600	4	1,860
1–10	24836 Canadian (Purple Flowers)..	.	1,850	1	1,000	1	1,250	4	100	4	1,700
1–10	23396 Sand Lucerne	1	....	1	850	1	1,100	3	1,950	4	1,170

LETHBRIDGE.

VARIETY TESTS of Grasses.

Variety.	Size of plot.	Yield per acre, 1913.		Average yield per acre for five years.	
	Acres.	Tons.	Lb.	Tons	Lb.
Timothy	¼	2	240	2	908
Western Rye	½	1	790	2	958
Boneless Brome Grass	½	1	1,000	2	1,140

All the plots were cut on July 31.

A CHEAP ROOT CELLAR.

The question of providing a satisfactory frost-proof storage place for roots at small cost is a problem that meets every farmer as he locates on his land in this part of the province. The Station has found that a convenient way to build a root cellar at small expense is to make an excavation about 6 feet deep and cover with 7- or 8-foot fence posts—the ordinary split cedar ones are quite satisfactory—laid 5 to 7 inches apart. Over these is put a foot or more of straw and then two feet of soil. Little trouble is ever experienced with the sides giving way, provided rain water is not allowed to collect around or in the cellar.

Split cedar posts are used for the roof as they are the cheapest material available, selling locally in most points in the district at 12 cents to 14 cents a-piece. Either 7- or 8-foot ones can be used. If the former, the excavation should be made 11½ feet wide and as long as desired up to 50 or 100 feet or more. On account of the shape of the excavation it can be nearly all taken out with a plough and scraper, the only hand work necessary being a little on the sides to keep them true and plumb.

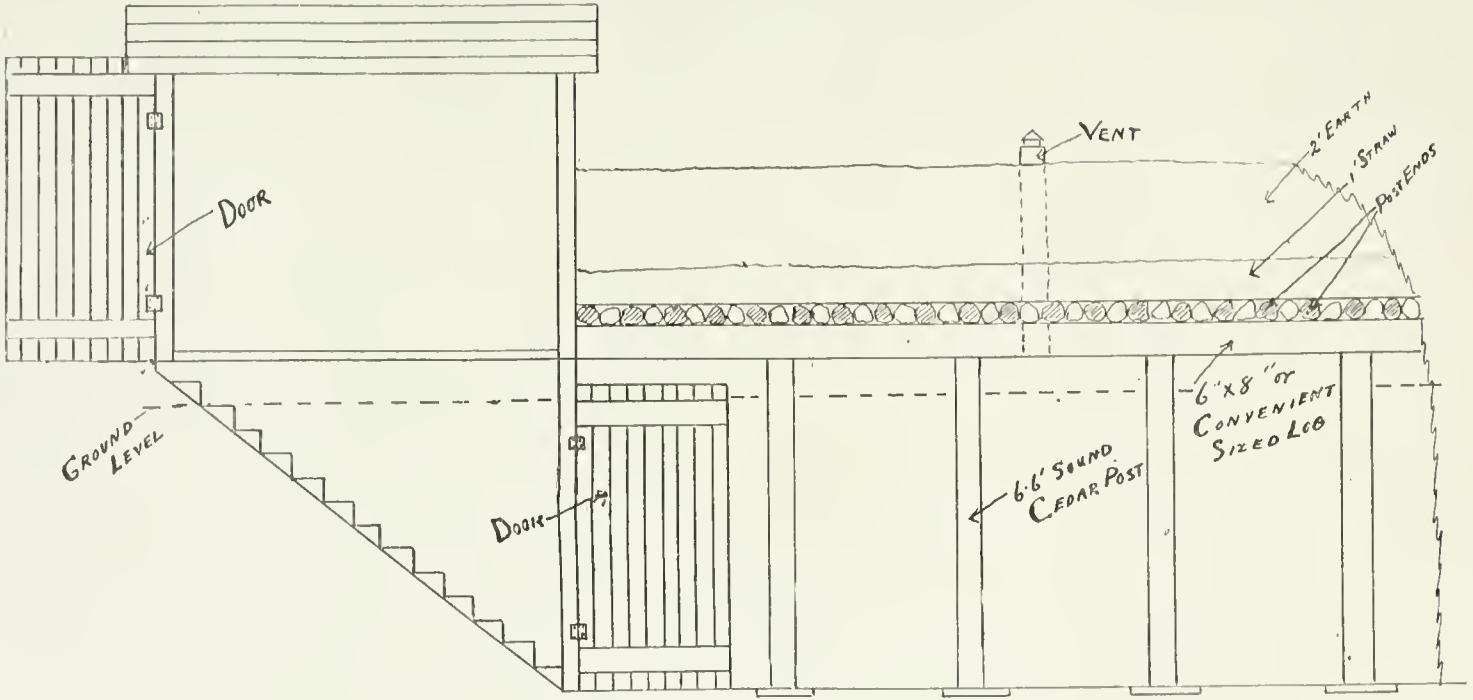
After the excavation is made, a 6- by 8-inch timber or a convenient-sized log the full length of the cellar is placed in position supported by sound posts placed about 4 feet apart. These posts should be placed on mud sills in the form of large flat stones or pieces of plank to prevent settling when the earth roof is put on. Posts are then laid side by side running from the ridge pole to the side, as indicated in the illustrations. A good layer of straw is put on and then plenty of soil, not less than 2 feet in any place. Ventilators are provided. Sometimes shoots 20 inches or 2 feet in diameter are provided in the roof to make it more convenient to get the roots in.

The entrance now has to be considered, and it is important that this is carefully planned so as to prevent the possibility of frost getting in. Double doors are necessary. If the cellar is placed on the side of a hill the entrance is simple, but if it is necessary to build on level ground, as is often the case, some such plan as illustrated in the accompanying sketch is necessary. A trap door in place of the roofed entrance way may be used, but the objection to it is that snow is apt to drift over it badly, often causing considerable inconvenience. By using the small-roofed entrance way, as indicated, this difficulty is avoided.

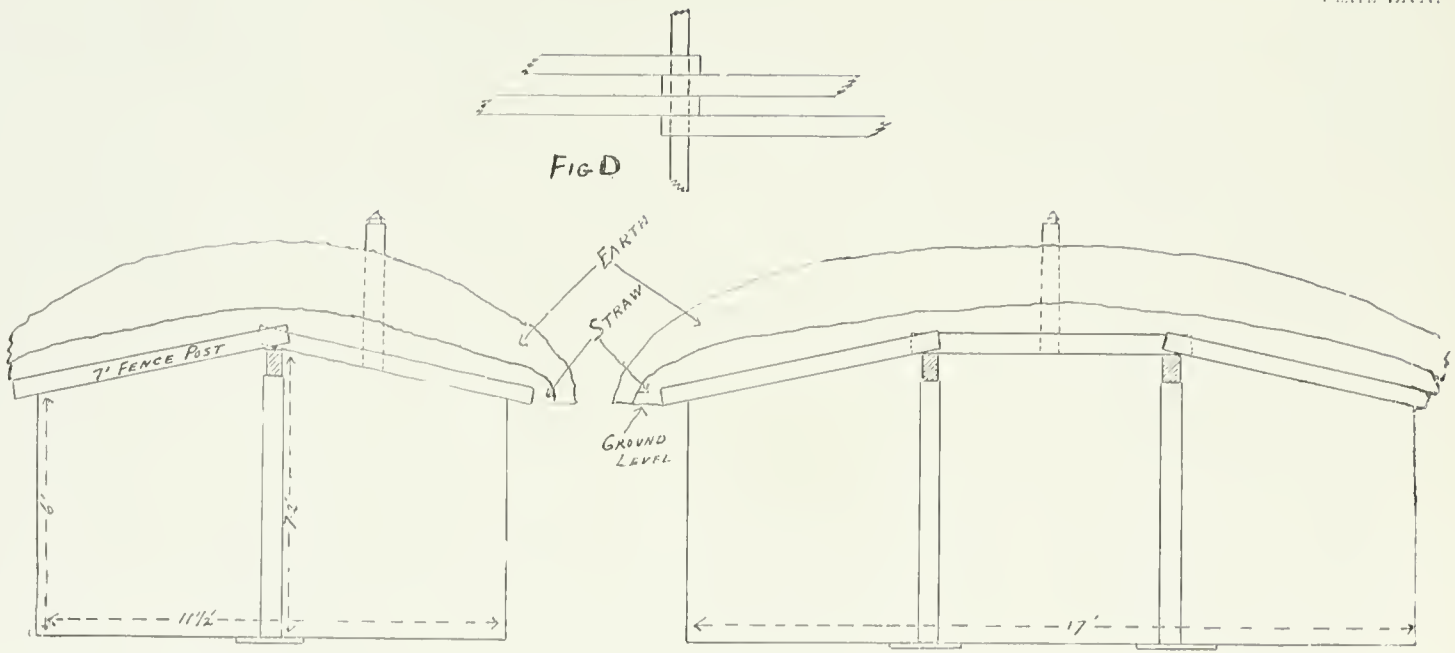
If a large cellar is required, two ridge poles may be provided, placing them 6 feet apart, thus making the total width of the cellar 17 feet. The rest of the cellar would be made in the same way.

LETHBRIDGE.

16—1915—p. 940.



A Cheap Root Cellar.



A Cheap Root Cellar

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A

INDIAN CORN.

Eight varieties of Indian corn were planted on May 26, 1913, in hills 30 inches apart each way. The soil was black clay loam which was ploughed out of timothy and clover sod in July of 1912. The land was packed immediately after ploughing, worked up with the disc and drag harrowed in the fall. All varieties of corn were tasselled when cut, though the earlier sorts were considerably further advanced than later varieties. Each variety was grown on an area 1/50 of an acre in extent and the yield per acre computed from same.

INDIAN CORN FOR ENSILAGE.—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when cut.	Weight per Acre.	
				Inches.		Tons.	Lb.
1	Compton's Early	May 26th	Sept. 9	67¾	Tasselled	10	
2	Early Longfellow	" 26th	" 9	65¼	"	9	1,500
3	Salzer's North Dakota	" 26th	" 9	65½	"	9	
4	Longfellow	" 26th	" 9	70¼	"	8	1,750
5	Canada Yellow	" 26th	" 9	62¾	"	7	300
6	Ninety Days	" 26th	" 9	66	"	6	400
7	Windus Yellow Dent	" 26th	" 9	58¼	"	4	1,450
8	Thayer White Dent	" 26th	" 9	57	"	3	1,950
					Average	7	919

TURNIPS.

Sixteen varieties of field turnips were tested. The land was ploughed in July of 1912 out of timothy and clover sod. It was packed and well cultivated in the fall. The seed was sown on June 4 on the level in rows 28 inches apart. The plots were 1/50 of an acre in size. Harvest took place on October 4.

TURNIPS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons	Lb.	Bush.	Lb.
1	White Globe	28	450	940	50
2	Mammoth Greystone	26	1,400	890	
3	Yellow Aberdeen (Green Top)	21	800	713	20
4	Yellow Aberdeen (Purple Top)	19	1,800	663	20
5	Good Luck	19	...	633	20
6	Perfection	18	1,550	625	50
7	Lapland	18	750	612	30
8	Hartley's Bronze Top	16	1,200	553	20
9	Mammoth Clyde	16	850	547	30
10	Prize Purple Top	16	250	537	30
11	Jumbo	16	....	533	20
12	Magnum Bonum	15	600	510	..
13	Bangholm	15	....	500	..
14	Hall's Westbury	13	850	447	30
15	Halewood's Bronze Top	12	1,800	430	..
16	White Swede	6	800	213	20
	Average	17	1,069	584	20

MANGELS.

Eleven varieties of mangels were seeded on May 15 on the level in rows 28 inches apart, on soil similar to that on which the turnips were seeded, black clay loam, and handled in a similar manner. They were harvested September 23.

MANGELS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Giant Yellow Globe	6	1,500	225	
2	Selected Yellow Globe	5	600	176	40
3	Giant Half Sugar White	4	1,100	151	40
4	Gate Post	4	600	143	20
5	Danish Sludstrup	4	350	139	10
6	Yellow Leviathan	4	100	135	
7	Giant Yellow Intermediate	4	....	133	20
8	Golden Tankard	3	1,950	132	30
9	Prize Mammoth Long Red	3	1,200	120	
10	Mammoth Long Red	3	850	114	10
11	Perfection Mammoth Red	3	550	109	10
	Average	4	618	143	38

CARROTS.

Eight varieties of field carrots were tested. The seed was sown May 15 on the level in rows 28 inches apart. High winds blew out a large quantity of the seed and checked growth of the plants that remained. They were harvested on September 23.

CARROTS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Improved Short White	4	1,650	160	50
2	Ontario Champion	3	950	115	50
3	White Belgian	3	550	109	10
4	Cooper's Yellow Intermediate	2	900	81	40
5	Giant White Vosges	2	150	69	10
6	Mammoth White Intermediate	2	100	68	20
7	Long Red Surrey	1	1,900	65	
8	Long Orange	1	1,350	55	50
	Average	2	1,444	90	44

SUGAR BEETS.

Three varieties of sugar beets were tested. The seed was sown on May 26 in rows 28 inches apart on land ploughed out of sod in July of 1912 and fall worked. High winds interfered with the yield of this crop. The crop was harvested September 23.

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Vilmorin's Improved A	5	1,100	185	
2	Klein Wanzleben	4	1,700	161	40
3	Vilmorin's Improved B	4	1,600	160	
	Average	5	133	168	53

ALFALFA.

The Grimm and Turkestan varieties of alfalfa continued to prove hardier than any other varieties which are suitable for commercial use, and which have been tried up to date. Three acres of alfalfa were this year seeded in drills 28 inches apart and cultivated during the early part of the summer. The young plants made a vigorous start and an interesting comparison will be possible next season between the crop on this area and that on a block of the same kind of alfalfa seeded broadcast.

Moles, or pocket gophers, are giving trouble on our fields of alfalfa which have been longest seeded, and have totally eaten out quite a large section of this area. It is an expensive matter to combat this pest as the runs must be found and the animals either trapped or poisoned in the runs underneath the surface.

GRASSES AND CLOVERS.

Five selections of timothy seed were seeded last spring on one-eightieth acre plots in duplicate. Half of these will be compared as to their value for the production of hay, and from the remainder seed will be saved.

The same plan was followed out with a similar number of collections of clover seed.

Kentucky Blue grass is being used by Central Alberta farmers as a permanent pasture. This valuable grass does remarkably well on this soil. It is one of the earliest to produce forage in the spring, stands heavy pasturage well, and continues growth late in the fall.

LACOMBE.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

INDIAN CORN AND FIELD ROOTS.

Variety tests were conducted with a number of varieties of Indian corn, turnips, mangels, carrots, and sugar beets.

Every variety was grown in two plots, situated some distance apart in the field allotted to the experiments.

In some cases the two plots of the same variety yielded exactly the same, while in others there was a marked difference between them.

This difference in yield between two plots of exactly the same variety, due to slight variation of the soil, tends to emphasize the value of the double-plot system.

By calculating the yield of a variety from the average yield of two plots, more reliable figures will be obtained as to the yielding capacity of the variety in question than if the yield were based on the crop harvested from a single plot only.

Indian Corn.

The fodder corn was planted on fall-ploughed land which was not particularly fertile and which was quite badly infested with couch grass. The planting of these plots was done somewhat later than usual, which influenced to some extent the yield of the various plots. The vitality of some of the seed was not up to standard and it was planted accordingly, in some cases as many as eight seeds to the hill. This, however, gave a hundred per cent stand, and in some cases a little thinning had to be done. The plots were planted in hills 3 feet apart, as this distance has proved the best in our experience.

As, according to experience gained through experiments during a number of years, in nearly every case the yields of ensilage bear a direct relation to the strength and per cent of germination, it is of the greatest importance that all corn seed be tested before planting.

It is furthermore of importance that right varieties be chosen for ensilage.

As, under ordinary conditions, there is no danger of the corn becoming too ripe for ensilage, and, furthermore, as the later varieties generally do not mature enough, it is evident that the early varieties are preferable to the late ones. From a general point of view, the corn that grows until the grain is in the soft dough stage is the most satisfactory to handle, store and feed.

Of the eight varieties of Indian corn grown, Compton's Early gave slightly the highest yield, followed closely by Early Longfellow. Although sometimes not making quite the highest yield these two varieties usually give the best results from a silage standpoint, and can therefore be recommended for general use.

Under trial are, however, some new varieties which may prove superior in time.

A small plot of seed was ripened but of this we can say but little at present. The quality was only fair. Although a small quantity of good seed was obtained, the bulk of the crop consisted of nubbins.

The yields of the different varieties are as follows:—

INDIAN CORN FOR ENSILAGE.—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when cut.	Weight per Acre.
				Inches.		Tons Lb.
1	Compton's Early	May 31	Oct. 7	86	Soft dough	17 1,179
2	Early Longfellow	" "	"	94	Late milk	16 1,713
3	Longfellow	" "	"	90	Soft dough	15 1,514
4	Ninety Days	" "	"	87	Soft dough	13 1,117
5	Salzer's North Dakota	" "	"	84	Soft dough	11 819
6	Windus Yellow Dent	" "	"	88	Late milk	10 512
7	Canada Yellow	" "	"	63	Ripe	8 1,799
8	Thayer White Dent	" "	"	78	Late milk	8 1,589
	Average					12 1,780

MANGELS.

The mangels were sown in drills 2½ feet apart and 14 inches apart in the drill. The seed was planted at the rate of 9 pounds per acre, this quantity giving us a perfect stand at the time the plants appeared above the ground.

The experiments with mangels were carried out on land which the previous year was in clover. The land was fall-ploughed and given a light dressing of farmyard manure. At the time of planting, a small amount of chemical fertilizers was sown in the drills.

That a dressing of chemical fertilizers, applied in the drills at the time of planting, greatly increases the yield is the experience gained by tests carried out during the past three years. By application of the fertilizer at the time of planting the tender seedlings are given a supply of easily accessible food, enabling them to make a rapid and vigorous start.

Out of eleven varieties tested, the Danish Sludstrup proved to be the leading one. The Danish Sludstrup is a favourite in Denmark, highly recommended for its large yield of dry matter per acre. It is a long, yellowish-red mangel which grows high out of the ground and has a compact root and a close, neat top. The other varieties are all well known and are listed on the table in the order of their gross yield per acre only. Seed was sown on May 2, and the crop harvested November 10.

MANGELS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons	Lb.	Bush.	Lb.
1	Danish Sludstrup	36	1,700	1,228	20
2	Prize Mammoth Long Red	34	1,450	1,157	30
3	Giant Yellow Globe	34	287	1,138	7
4	Yellow Leviathan	32	125	1,068	45
5	Giant Yellow Intermediate	31	600	1,043	20
6	Mammoth Long Red	31	600	1,043	20
7	Giant Half Sugar White	30	1,700	1,028	20
8	Selected Yellow Globe	30	1,552	1,025	52
9	Golden Tankard	27	1,075	917	55
10	Gate Post	27	75	901	15
11	Perfection Mammoth Red	25	125	835	25
	Average	31	117	1,035	17

Turnips.

Ten varieties of turnips were grown, and, being badly infested with the cabbage maggot, gave only fair yields. On account of the unevenness of stand, some of the turnips were very coarse. The Bangholm heads the list with a yield of 30½ tons per acre, being 10 tons in advance of the lowest yielder.

The turnips were sown in drills 2½ feet apart and 14 inches apart in the drill.

On account of the infestation of the cabbage maggot, one-half of each of the two duplicate plots of all varieties was treated with either kerosene emulsion or crude carbolic acid. This work was done by Mr. R. C. Treherne, of the Division of Entomology. From what can be learned from the year's experiments, however, little or no benefit was derived from the application of either one of the two insecticides referred to.

Seeding took place on May 8, and the crop was harvested November 10.

Turnips.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Bangholm	30	1,000	1,016	40
2	Corning's Lapland	27	.....	900	..
3	Good Luck	25	900	848	20
4	Hartley's Bronze Top	25	75	834	35
5	Hall's Westbury	24	1,625	827	5
6	Magnum Bonum	24	1,075	817	55
7	Perfection	23	850	780	50
8	Halewood's Bronze Top	22	1,975	766	15
9	Jumbo	22	925	748	45
10	Mammoth Clyde	20	1,275	687	55
	Average	24	1,370	822	50

Carrots.

Of the nine varieties of carrots tested, Improved Short White, for the third successive year, heads the list, with a yield of 28 tons 612 pounds to the acre.

The carrots were planted in drills the same width apart as the mangels, namely 2½ feet, and were left 7 inches apart in the rows.

It should be mentioned especially that carrots do exceptionally well on the average sandy soil of the Experimental Farm. The handling of the crop, including singling out in the rows and pulling is, however, a little more expensive than the handling of mangels.

Seeding took place on the 8th of May and the crop was harvested November 11.

CARROTS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lb.	Bush.	Lb.
1	Improved Short White	28	612	943	32
2	Mammoth White Intermediate	26	1,125	885	25
3	White Belgian	25	800	846	40
4	Ontario Champion	25	50	834	10
5	Half Long Chantenay	22	1,725	762	5
6	Cooper's Yellow Intermediate	22	1,575	759	35
7	Giant White Vosges	20	812	680	12
8	Long Orange	16	1,975	566	15
9	Long Red Surrey	16	575	542	55
	Average	22	1,472	757	52

SUGAR BEETS.

The sugar beets were grown on the same kind of land and under the same treatment as the mangels, but were thinned to only 8 inches in the row. The seed was sown on May 7 and the crop harvested November 10.

The following table will show the results of the varieties tested:—

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Yield per Acre.		Yield per Acre	
		Tons.	Lb.	Bush.	Lb.
1	Klein Wanzleben	23	750	779	10
2	Vilmorin's Improved "A"	21	1,200	720	..
3	Vilmorin's Improved "B"	21	75	701	15
	Average	22	8	733	28

GRASSES AND CLOVER.

With a view of producing, by continuous natural mass selection, strains of clovers and grasses particularly adapted to the coast districts of British Columbia, a series of experiments was started with clover and a few grasses including Timothy, Orchard grass and Italian Rye grass.

The different plots made fair growth during the season, although badly infested with weeds. However, at the end of the season, there was a reasonably good stand of clover. Some of the timothy plots were exceptionally good.

AGASSIZ.

SUB-STATION, FORT VERMILION, ALTA.

REPORT OF ROBERT JONES.

INDIAN CORN.

The past summer was very favourable for corn growing on account of the hot and dry weather throughout the summer, with no setback except one slight frost on the 24th of June. Of the six varieties planted four were fit for use. The seed was sown on May 6 in one-thirtieth acre plots in hills 3 feet apart. The crop was cut on September 22, and weighed while still green.

Below are the results obtained:—

Name of Variety.	Date of Planting.	Date of Cutting.	Average Height.	When in Tassel.	When in Silk.	Condition when cut.	Weight per acre in hills.		In use.
			Inches				Tons.	Lb.	
Longfellow Red Nose...	May 6	Sept. 22	27	Aug. 8	Sept. 15	Cobs very small and green.	17	1,640	
Longfellow.....	" 6	" 22	64	" 1	" 10	Cobs first formed	17	320	
Seed from Colorado.....	" 6	" 22	36	July 18	July 24	Doughy	4	1,240	Sept. 1
Early Malcolm	" 6	" 22	38	" 22	Aug. 4	Late milk.....	5	1,400	" 5
Early Gorohoon	" 6	" 22	52	" 30	" 8	....	5	1,700	
Early Cory.....	" 6	" 22	50	" 25	" 6	Late milk.....	5	140	" 15

WHITE SQUAW.

One row 33 feet long 11 hills 3 feet apart, in tassel July 16; length of stalk 2 feet, in silk July 22; 4 bundles of stalks 6 pounds per bundle, could be used from August 7, quite ripe when cut September 22.

FIELD ROOTS.

All the uniform test plots of roots were grown on land that had grown wheat in 1911 and had been fallowed in 1912. The land had been ploughed in the early part of June, 1912, with manure at the rate of 20 tons per acre, and thoroughly cultivated through the summer.

TURNIPS.

Four varieties of turnips were sown in uniform plots of one-thirtieth of an acre. The seed was sown in drills 2½ feet apart and the young plants thinned to about 12 inches apart in the rows. The seed was sown May 5 to 13, and the roots pulled on September 29.

The following are the yields obtained:—

TURNIPS.—Test of Varieties.

No.	Name of Variety.	Description of Variety.	Yield per Acre.			
			Tons	Lb.	Bush.	Lb.
1	Perfection	Round, purple	20	1,340	689	
2	Magnum Bonum	Flat, round, purple	20	220	670	20
3	Good Luck	Round, purple	19	430	640	30
4	Hartley's Bronze Top	Medium long, bronze	19	123	635	23
		Average	19	1,528	658	48

MANGELS.

Four varieties of mangels were sown on May 7, on land that had the same preparation as for turnips. The plots were pulled on September 27. The following are the yields obtained:—

MANGELS.—Test of Varieties.

No.	Name of Variety.	Size.	Yield per Acre.			
			Tons.	Lb.	Bush.	Lb.
1	Gate Post	Large	25	1,000	850	
2	Giant Yellow Globe	Large	24	540	809	
3	Giant Yellow Intermediate	Medium	21	1,560	726	
4	Prize Mammoth Long Red	Medium	20	1,940	699	
	Average		23	260	771	

CARROTS.

Four varieties of carrots were sown in uniform test plots of one-thirtieth of an acre each.

Sown May 10 and 12, and pulled September 23.

The following are the yields obtained:—

FIELD CARROTS.—Test of Varieties.

No.	Name of Variety.	Size.	Yield per Acre.			
			Tons.	Lb.	Bush.	Lb.
1	Ontario Champion	Large	19	940	649	
2	White Belgian	Large	19	760	646	
3	Mammoth White Intermediate	Medium	18	1,260	621	
4	Half Long Chantenay	Medium	16	700	545	
	Average		18	915	615	15

SUGAR BEETS.

Three varieties of sugar beets were grown in uniform test plots of one-thirtieth of an acre each. The seed was sown in drills 26 inches apart and the plants thinned out to 1 foot apart in the row. The seed was sown May 10, and the roots pulled September 22.

The following are the yields obtained:—

SUGAR BEETS.—Test of Varieties.

No.	Name of Variety.	Size.	Yield per Acre.			
			Tons.	Lb.	Bush.	Lb.
1	Vilmorin Improved	Medium	18	....	600	
2	Klein Wanzleben	Medium	17	500	575	
3	French Very Rich	Small	15	1,080	518	
	Average		16	1,860	564	

GRASSES.

Two plots of Canary grass were sown: one plot of one-sixtieth of an acre and one of one-half acre.

The yield from the one-sixtieth acre plot was at the rate of 2 tons 86 pounds per acre, and, that from the one-half acre plot 2 tons 940 pounds per acre. They were cut August 1. All the other plots of grass were ploughed up in June after manure at the rate of 15 tons per acre had been applied. The land was disced twice and a smoothing harrow run over a number of times. This land will be in readiness for the spring of 1914.

ALFALFA AND SAINFOIN.

Alfalfa was again sown this summer. The seed was sown on June 4 in one-fortieth acre plots on land that had grown roots the previous year. The alfalfa made very healthy growth throughout the season.

Up to the present no entirely satisfactory crop of alfalfa has been grown at the Station, it being always partially killed out during the first winter. So far, there has consequently never been a full stand the following season. The seed sown this summer was from the Lacombe Experimental Station.

Sand Lucerne.—Cut August 12; length of stalk, 22 inches; yield per acre, 1 ton 1,000 pounds.

Grimm's Alfalfa.—Cut August 12; length of stalk, 21 inches; yield per acre, 1 ton 600 pounds.

Spanish Sainfoin.—One plot sown on June 4 in a one-fortieth acre plot; cut on August 12; length of stalk, 16 inches; yield per acre, 1 ton.

VERMILION.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT

FROM

THE POULTRY DIVISION

For the Year Ending March 31, 1914

PREPARED BY

The Dominion Poultry Husbandman, Ottawa. . . . . F. C. Elford.

Superintendent—

Experimental Station, Charlottetown, P.E.I. - - - - - J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S. - - - - - - - - - W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S. - - - - - - - W. S. Blair.
Experimental Farm, Fredericton, N.B. - - - - - - - W. W. Hubbard.
Experimental Station, Cap Rouge, Que. - - - - - - - G. A. Langelier.
Experimental Farm, Brandon, Man. - - - - - - - - W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask. - - - - - - T. J. Harrison, B.S.A.
Experimental Station, Lacombe, Alta. - - - - - - - G. H. Hutton, B.S.A.
Experimental Farm, Agassiz, B.C. - - - - - - - - - P. H. Moore, B.S.A.
Experimental Station, Invermere, B.C. - - - - - - - G. E. Parham.

REPORT FROM THE POULTRY DIVISION.

OTTAWA, ONT., July 6, 1914.

The Director,
Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twenty-seventh annual report of the Poultry Division, being the first since its reorganization, at which time I took charge.

Included herein are reports of the Experimental Farms and Stations where poultry work is being carried on, prepared by the following Superintendents: J. A. Clark, Charlottetown, P.E.I.; W. W. Baird, Nappan, N.S.; W. S. Blair, Kentville, N.S.; W. W. Hubbard, Fredericton, N.S.; Gustave Langelier, Cap Rouge, Que.; W. C. McKillican, Brandon, Man.; T. J. Harrison, Indian Head, Sask.; G. H. Hutton, Lacombe, Alta.; G. E. Parham, Invermere, B.C.; and P. H. Moore, Agassiz, B.C.

During the past year poultry work has been commenced at eleven of the branch Farms and Experimental Stations, with a poultry man in charge of each plant. Some of the foundation stock for these plants has been supplied from the Central Farm, but owing to the limited number of breeding stock we have had here, it was necessary to procure most of the eggs and breeding stock from other sources, a good deal of which may have to be replaced as soon as better stock can be obtained from the Central plant.

The three new buildings erected on the Central plant this year have helped considerably in the work, and as soon as the administration building is erected and the old buildings removed, the plant will be rearranged so that not only can the work be accomplished more economically, but visitors will be enabled to see the plant and experiments without inconvenience.

In February, Mr. Geo. Robertson was appointed Assistant, and his help in selecting the numerous experimental matings, as well as the breeding pens, has been most valuable. The demand for lectures and judging continues. During the year, Mr. Victor Fortier, Assistant Poultry Husbandman, has been absent 106 days attending meetings and fairs in Quebec and Ontario, and many requests have had to be refused because of previous engagements.

During the year one bulletin has been published and eight pamphlets are in process of preparation. The bulletin published is No. 16, second series, "How to Tell the Age of Hens and Pigeons," by Victor Fortier. It is the first of its kind that has ever been published by any Station, and is meeting with a kind reception.

I wish to acknowledge the hearty co-operation of members of the Experimental Farm staff in our experimental work, especially that of the Dominion Chemist, Dr. F. T. Shutt, in the examination of feeds and his assistance in the Port Arthur screening experiment, and also that of Dr. C. H. Higgins, Dominion Pathologist, who has always been ready to advise in reference to poultry diseases and to co-operate in this most important line of investigation.

I have the honour to be, sir,
Your obedient servant,

F. C. ELFORD,
Dominion Poultry Husbandman.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

REPORT OF THE DOMINION POULTRY HUSBANDMAN, F. C. ELFORD.

FEATURES INFLUENCING THE POULTRY INDUSTRY.

The past year has had at least two features that have affected the poultry industry and that may be of interest here, the one refers to conditions influencing the general price of eggs, and the other the importation of Chinese eggs into Canada.

Owing to the mild winter and comparatively early spring of 1912-13 throughout Canada, hens laid well, which resulted in a good supply of new laid eggs on the market early in the season. The same conditions prevailed in the Western States and, as a result, eggs in Chicago were very low and a considerable quantity of the southern eggs were imported into Canada. These, along with our own supply, brought the prices lower in February than they had been for several years.

The spring, though early, was cold and long drawn out, and the early summer, especially around Ottawa, dry: as a consequence the young stock did not mature as well as usual, and the pullets were not developed as they should have been when entering winter quarters in the fall of 1913.

The extremely heavy laying in the mild winter and spring of 1913, followed by the somewhat backward growth of the pullets during the summer and fall, left the laying stock in comparatively poor condition for winter, and of course the scarcity of new-laid eggs last winter and the accompanying high prices were a natural consequence, and an "egg famine" was frequently predicted.

Prices for strictly new-laid eggs in Ottawa were in some cases 75 cents and 80 cents per dozen, while in Montreal $1 was reported in special cases. The stores in Ottawa were charging 60 cents, though prices for eggs from the Experimental Farm were not higher than 50 cents, as this was thought high enough even for strictly new-laids. This condition was quite general throughout Canada, and though prices may not go to such a height for some time again, yet strictly new-laid eggs in the season of scarcity will always demand a high figure, as every year there are more people who will have them no matter what they cost.

The surplus new-laid eggs at the Farms and Stations are sold for eating purposes, and the prices obtained, though they may not be the actual prevailing local prices, indicate the relative prices for strictly new-laid eggs throughout the Dominion. The following table shows the average prices obtained, by provinces, for the three winter months of December, January, and February, and also the average price for the three months:—

TABLE No. 1.—Prices, by Provinces, of New-laid Eggs at the Experimental Farms and Stations for three Winter Months.

Province.	No. of Plants.	Dec.	Jan.	Feb.	Average.
		Cents.	Cents.	Cents.	Cents.
Central Experimental Farm, Ottawa	1	50	50	50	50
British Columbia	2	55	54	51	53
Alberta	1	*	*	35	35
Saskatchewan	1	50	50	50	50
Manitoba	1	*	30	30	30
Nova Scotia	2	32	31	30	31
New Brunswick	1	40	40	35	38
P.E.I.	1	31	32	30	31
Average price		43	41	39	

* No prices given.

It will be noticed that December had a higher average price than had the months of January or February, and this is usually the case for the strictly new-laid quality.

British Columbia comes highest in average price, and Manitoba lowest. One of the reasons for Manitoba's comparatively low price is because of its nearness to Chicago, from which so many train loads of eggs are shipped into Canada every spring. The high prices reported from British Columbia are largely owing to the Station at Invermere in the Upper Columbia valley, where because of local conditions the prices were exceptionally high, December 70 cents, January 68 cents, and February, 62 cents.

During the year a shipment of Chinese eggs arrived in Canada and found their way to many centres throughout the country. In Ottawa they were sold as ordinary stored eggs, and it is quite possible that those consuming them were not aware that they were not Canadian or at least American. It is likely, however, that they were used only in cooking. The eggs were smaller than ours, and in some places were disposed of as "pullets'" eggs. According to the Customs figures, there were in these shipments 406,562 dozens, valued at $59,954.

This Chinese invasion need not frighten the Canadian producer who markets the strictly new-laid egg, as the class of eggs likely to be received from this source will not come into competition with his superior quality. The shipments from the United States however, are a much greater factor in influencing the general prices in Canada, and though these should not come into competition with our new-laids in the winter, they do help to bring down the prices in the early spring a few weeks before our own fresh eggs come on the market. During the last fiscal year, 11,274,036 dozens of eggs were imported into Canada, at a cost of $2,630,364. Poultry to the value of $293,513 was also imported into Canada.

In an agricultural country like Canada it does seem as if we should grow enough eggs and poultry at least for our own use.

THE YEAR'S INVESTIGATIONS.

Most of the investigational work to report this year is comparatively new, and because of this the experiments reported will not be many and in some cases the report will be one of progress rather than of final results.

The experiment on cotton-front houses has been running since 1907, so that the report this year will be but a continuation. Other experiments such as breeding must necessarily cover indefinite periods, and may take several years before there will be anything to report

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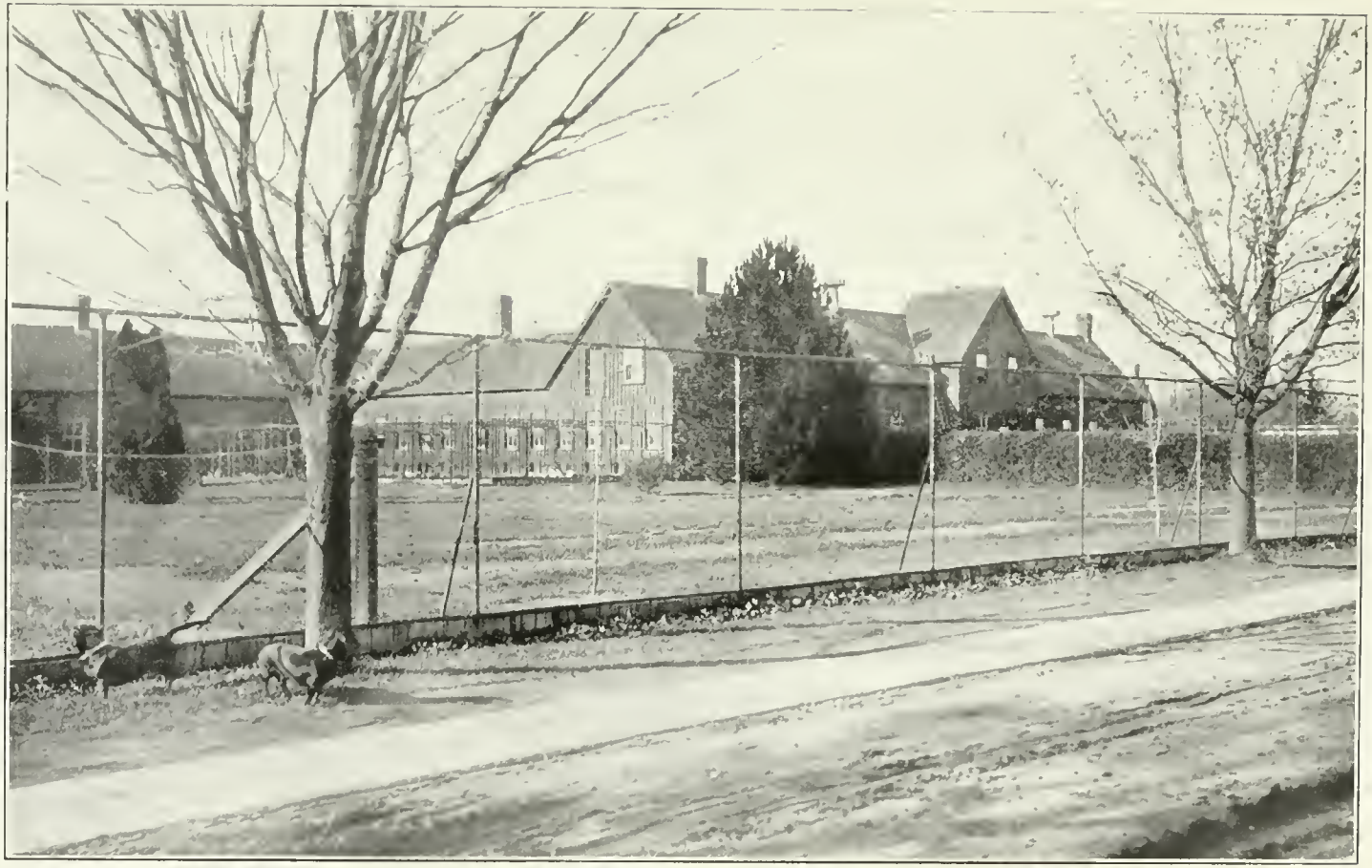

The old Poultry Buildings. View of the permanent poultry houses on the Central Experimental Farm. These houses have been doing service for 25 years, but are being removed to make room for something more suitable and up-to-date.

A few experiments have been conducted and are being reported on this year. It would be well to note, however, that this investigational work has been in operation but the one year since the reorganization of the Division, during which time new buildings and temporary quarters have interfered to no little extent with this work, and it may be possible in the light of future experiments that the ultimate findings in some of these may vary.

COTTON-FRONT HOUSES.

That the so-called cotton-front house has demonstrated its usefulness even in cold climates is becoming the experience of many practical poultrymen.

The cotton front house, built in 1907, was the first of this type that was constructed on this Farm. Since that time the reports of this Division have all contained more or less information on temperature, egg yield, fertility, and healthy condition of the stock housed under these conditions; but it has always been a matter of conjecture as to the correct area of cotton or the proper proportion of cotton and glass necessary to give the maximum temperature with minimum range and good ventilation.

"I have 'lots' of cotton on my poultry house but still moisture accumulates on the inside and the litter on the floor soon becomes damp" is the complaint of numerous correspondents and visitors seeking advice from this Division, but the cotton area allowed per bird and cubic air space is never mentioned.

The table of temperatures, floor space, cubic air space per bird, etc., given below is not shown as a decision on any particular house, but to point out that all of these factors have an influence in determining the suitability of any house.

TABLE No. 2.—Showing the maximum and minimum; also range and average temperature in poultry houses having various proportions of cotton and glass.

No. of pen.	Floor space, sq. ft.	Cubic air space, cu. ft.	Cubic space per bird, cu. ft.	Glass, sq. ft.	Cotton, sq. ft.	Temperature.											
						Max.			Min.			Range.			Average.		
						Dec.	Jan.	Feb.	Dec.	Jan.	Feb.	Dec.	Jan.	Feb.	Dec.	Jan.	Feb.
						°	°	°	°	°	°	°	°	°	°	°	°
16	340	2,560	66	20	32	44	44	45	15	4	4	29	40	49	31·8	24·2	21
17	340	2,560	44	20	32	48	43	16	16	4	4	32	39	50	33·1	26·6	28
19	80	580	32	12	30	52	58	46	10	14	16	42	72	62	28	25·8	26
22	150	1,012	26	17	47	46	52	54	4	20	22	42	72	76	30·1	22·5	19 2
23	120	1,010	37	12	12	48	48	50	6	19	22	42	67	72	30·1	21·4	17
24	120	810	25	16	43	52	48	46	8	14	18	44	62	64	30·3	23·7	21
25	80	520	32	.....	16	48	....	50	12	....	14	36	....	64	32·7	....	21
26	80	560	35	9	21	44	44	44	6	10	20	38	54	64	29 5	23 8	16
27	80	520	26	12	41	58	47	52	3	10	16	55	57	68	32·2	23 3	18
28	80	400	26	9	21	48	50	40	10	12	16	38	62	56	31·8	23·4	18 6

NOTE.—Pens Nos. 16, 17 and 19 are permanent, the remainder are portable colony houses. Pens Nos. 16 and 17 were the east and west halves of a Tolman style house. Pen No. 23 had a straw loft and the glass window was replaced by a cotton screen at night.

DEDUCTIONS.

It will be seen from the above that pens 16 and 17, which are two divisions of one house, are considerably warmer than any of the other houses, and this in spite of the fact that the space allowed in these two is over twice that allowed per bird in

some of the other houses. The cotton area is somewhat less in comparison and yet the house and litter was always dry. A cut of the house appeared in last year's report on page 672 and is now known as the "Gilbert" house.

In the open air the thermometer registered as low as 30° below and, taking all things into consideration, this would at first appear to be as nearly ideal conditions as it is possible to obtain in an unheated house and still maintain an abundance of fresh air without draughts, the temperature, with one exception of 4°, never falling below zero.

Lack of sunshine in the house, however, detracted from the results that were expected from these otherwise favourable conditions, and it is now proposed to experiment with a house of similar construction but without a centre partition as exists in this house, so that the whole interior will get the benefit of the sun's rays from the east and west windows without interruption.

Of the movable colony houses, pen 27 showed up favourably, and it was noted that this house appeared the most cheerful and bright of the smaller types. This was no doubt due to the radiation through the glass beneath the cotton frames which made the floor and deep litter a cheerful spot for the hens.

The glass area running horizontally and not extending over 3 feet 6 inches higher than the floor, though quite satisfactory in a shallow house, would not be as suitable for a deep or wide house as a window that extended higher. The deeper the house the higher the glass should be to allow the sun to penetrate the farthest corners. The illustration is from a photograph of this type of movable colony house 8 feet by 10 feet.

Pen 24, the original cotton-front house frequently referred to in the reports from this Division, continues to hold its own for cheapness of construction, and the temperatures registered in this house would probably have been a little higher had it not been situated in a spot more shaded from the sun than some of the others.

Thus far our experience would indicate that for an 8-foot by 12 -foot colony house in this climate a suitable proportion of wood, glass, and cotton would be, estimating from the floor up, 15 inches wood, 2 feet glass, and 3 feet 6 inches cotton. This also allows the placing of the door in front.

BREEDING.

An investigation by numerous single matings is being carried out with a view of determining the influence of the male and female on the progeny, and how far each may be responsible for the vitality, fertility, production of eggs and meat, colour of plumage, type, sex, etc.

This work is of the greatest importance though unavoidably slow, and must necessarily extend over a period of years.

Work was started in this direction in the spring of 1913, but owing to extensive alterations to the buildings then and now going on, has been more difficult to handle than would otherwise have been the case.

Unavoidably changing birds from pen to pen naturally has interfered with results which, though encouraging, are hardly definite enough to be put forward authentically and will be held over for a subsequent report.

BROODING.

Because of the unsettled state of the plant, in that new buildings were not completed and other buildings not started, it was impossible to carry out the brooding experiments which were anticipated. Electric hovers placed in the cockerel house were used for brooding and into these were put the chicks when first out of the incubator. As other chicks arrived the early ones were moved into the

Simplex Brooder house and from there taken to the individual hovers placed in colony houses.

A ROOM BROODER.

The room brooder into which a Simplex Brooder stove is placed is intended for brooding on a fairly large scale. The house shown here will accommodate 500 to 800 chicks. It is divided into two rooms, the oil-burning stove is placed in one room while the other room is used for an indoor run.

This brooder has been used for two seasons at the Central plant and has proven a very satisfactory method of brooding chicks in large numbers, but should be operated to capacity or the expense of heating will be too high.

By making temporary divisions, chicks or ducks of various ages can be accommodated at the same time.

FERTILITY.

ONE MATING ONLY.

The following investigation was carried out with the object of determining the number of eggs that would be fertilized with one intercourse only.

Virgin females were selected, or those that had been separated from the male bird for at least eight months and were just about to lay.

The hens were taken individually from the trap nest after laying and allowed one intercourse only with the male.

Eggs laid after intercourse were placed in an incubator and tested on the seventh day.

TABLE No. 3.—Showing number of eggs fertilized by one mating only and the time that fertility was traceable.

No.	Date Mated.	Egg Laid.	Fertile or Infertile.	Egg Laid.	Fertile or Infertile.	Egg Laid.	Fertile or Infertile.	Egg Laid.	Fertile or Infertile.	Egg Laid.	Fertile or Infertile.
2	Mar. 24	Mar. 26	F	.....	.....	.....	.....	.....	.....	.....	.....
44	Mar. 26	Mar. 28	F	Mar. 29	F	Mar. 31	F	Apr. 2	F	Apr. 14	I
60	Mar. 26	Mar. 31	F	Apr. 2	F	Apr. 12	I	.....	.....	.....	.....
70	Mar. 27	Mar. 29	I	Apr. 1	I	Apr. 2	I	Apr. 5	I	Apr. 7	I
50	Mar. 28	Mar. 31	I	Apr. 1	I	Apr. 3	I	Apr. 4	I	Apr. 6	I
45	Mar. 28	Mar. 31	F	Apr. 1	I	Apr. 3	F	Apr. 4	F	Apr. 6	I
41	Mar. 28	Mar. 29	I	Mar. 31	F	Apr. 1	F	Apr. 2	F	Apr. 5	I
42	Mar. 28	Mar. 31	F	Apr. 1	F	Apr. 3	F	Apr. 5	I	Apr. 7	I
34	Mar. 25	Mar. 30	F	Apr. 1	F	Apr. 2	F	Apr. 6	F	Apr. 8	F
7	Mar. 25	Mar. 27	F	Mar. 29	F	Mar. 31	F	Apr. 3	I	Apr. 4	I
4	Mar. 26	Mar. 28	I	Mar. 30	I	Mar. 31	I	Apr. 2	I	Apr. 3	I
21	Mar. 28	Mar. 30	I	Apr. 7	I	Apr 8	I	.....	.....	.....	.....

NOTES.—"F." means fertile and "I." infertile.

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Hens 70, 50, 4, and 21 "missed," and their eggs were all infertile.

No. 34 laid five fertilized eggs in succession.

No. 45 laid an infertile egg preceded and followed by fertiles.

It appears from the results shown that five fertilized eggs is the maximum from one mating only, and is of interest on account of the possibility of strong fertility from the use of a good vigorous male with a larger flock of hens than is generally considered advisable.

All eggs were infertile after date in above table.

FERTILITY TEST FOLLOWING 12 HOURS MATING.

In conjunction with the previous experiment a test of the fertilizing powers of one male was also tried on another flock of hens that had not previously been mated.

In this instance, females were allowed intercourse *ad. lib.* with the male for about 12 hours and then removed to other quarters where there was no possibility of a repetition.

By studying the following table it is apparent at a glance that this arrangement is more conducive to results than the "one mating only" proved to be.

This method of mating appears highly satisfactory ensuring, as it does, the attention of the male to the laying hens only and safeguarding him from the interference of the non-layers or from wasting his energies in unprofitable attention.

The fairly early date of mating in an unusually cold spring mitigated against high fertility, and the fact that the males had been confined to small winter quarters for several months indicates that this system of mating might prove advantageous if generally adopted.

It is proposed to carry out an experiment on these lines through an entire hatching season, and on its conclusion more definite information will be available.

TABLE No. 4.—Showing high fertility obtained by mating about 12 hours, number of eggs fertilized without second intercourse, and date laid.

Hen.	Mated.	Egg laid.	Fertile or Infertile.	Egg laid.	Fertile or Infertile.	Egg laid.	Fertile or Infertile.	Egg laid.	Fertile or Infertile.	Egg laid.	Fertile or Infertile.	Egg laid.	Fertile or Infertile.
51	Mar. 30 ..	April 2. ..	I...	April 5. ..	F ..	April 28	I...	April 29	I...	May 4..	I. .	.....	.....
9	Mar. 30 ..	April 1. ..	F ..	April 3. .	F ..	April 4.	I...	April 6.	I...	April 16	I...	April 18	I.
47	Mar. 30 .	April 1. ..	F ..	April 2. ..	F ..	April 4.	F ..	April 6.	F ..	April 15	I...	April 17	I.
7	Mar. 30 ..	Mar. 31 ..	I...	April 1. ..	F ..	April 4.	F	April 6.	F ..	April 8.	F ..	April 10	I.
40	Mar. 30 ..	April 2. ..	F ..	April 14. .	F ..	April 26	I...	April 26	I...	.... ..	....	.....	.....
54	Mar. 31 ..	April 2. ..	F ..	April 3. ..	F ..	April 5.	F ..	April 6.	F ..	April 9.	I...	April 11	F.
69	Mar. 31 ..	April 2. ..	F ..	April 4. ..	F ..	April 8.	F ..	April 10	F ..	April 27	I. .	April 30	I.
74	Mar. 31 ..	April 1. ..	I...	April 3. ..	F ..	April 4.	F ..	April 6.	I...	April 7.	F ..	April 25	I.
48	Mar. 31 ..	April 1. ..	I...	April 3. ..	F ..	April 4.	F ..	April 7.	F ..	April 9.	F ..	April 11	F.
9	Mar. 31 ..	April 2. ..	F ..	April 4. ..	F ..	April 6.	F ..	April 8.	F ..	April 10	F .	April 14	I.
23	April 2. ..	April 8. ..	I...	April 10. .	F ..	April 13	F ..	April 15	F ..	April 19	I...	April 21	I.

NOTES.—Of the eleven hens in this test, three laid eggs the first day after mating and of these none was fertile; five hens laid the second day after mating, and all eggs were fertile.

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The number of fertile eggs that resulted from the one mating ranged from one in the case of hen No. 51 up to five in Nos. 48 and 9.

The first fertile eggs were received the second day after mating, and the last eleven days after, none being fertile after the eleventh day.

In the instance of hen No. 74 there was a repetition of the unfertilized egg preceded and followed by a fertile one; table No. 3, hen 45.

An egg laid the day after mating was never fertile. The second egg laid after mating was fertilized in ten instances out of eleven.

Five fertilized eggs is the maximum of any hen, as was noted in previous experiment. Table No. 4, hen No. 48, laid five fertilized eggs, the last egg being eleven days after mating.

INCREASE OF PEN FERTILITY AFTER THE INTRODUCTION OF MALE.

It was deemed advisable to keep a record of the increase in fertility day by day, the fluctuation and the time the maximum fertility would be reached when the male was introduced at the commencement of the hatching season.

For this purpose two pens of Barred Plymouth Rocks were selected and each mated with a vigorous cockerel. Pen 16 contained thirty-one 2 and 3 year-old hens, and pen 22 contained twenty-three pullets.

TABLE No. 5.—Showing Daily Increase in Fertility after Introduction of Male.

Pen.	Breed.	Date mated.	Per cent. Fertility, First to Twenty-first day.																				
			1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th	10th.	11th.	12th.	13th.	14th.	15th.	16th	17th.	18th.	19th.	20th.	21st.	In Pen.
16	Barred Plymouth Rocks.	Mar. 13th.	Nil	Nil	8·3	20·0	25·0	8·3	36·3	40·0	30·7	37·4	100·0	61 5	68·2	41·6	30·0	60·0	50·0	60·0	50·0	66·6	75 0	31 hens.
22	"	"	Nil	Nil	20 0	12·5	25·0	100.	66·6	75·0	72·7	83·3	55·5	91·6	90·9	72·7	75·0	100·0	76·1	78·5	87·5	84·6	100·0	23 pullets.
Average			Nil	Nil	14·1	16·2	25·0	54·1	51·4	57·5	51·7	60·3	77·7	76·5	79·5	52·1	52·5	80·0	63·0	69·9	68·7	75 6	87·5	. .....

The maximum fertility, 100 per cent was reached in the pullet pen 22 six days after mating, and occurred three times in a period of twenty-one days. A good showing when we take into consideration the number of females mated with one male and the unusually cold spring.

The maximum fertility of 100 per cent was reached in pen 16 which contained the old hens, on the eleventh day after introducing the male.

The fertility increased more rapidly and continued a good deal stronger in the pullet pen than in the pen of old hens.

It would seem, therefore, from the above that it is fairly safe to set eggs and sell them for hatching six days after mating, providing that the breeding stock possesses plenty of vigour.

It also is of interest to note that the first fertile egg was laid the third day after mating, though out of eleven eggs laid and set that day it was the only one fertilized and it produced a strong healthy chick.

FORTY-FOUR WHITE LEGHORN HENS WITH ONE MALE.

In the following experiment the object was to substantiate somewhat the deduction arrived at in the previous investigation, and also to note the time before one male would be giving the maximum fertility in a pen of many layers after being introduced to the pen.

In this experiment the male was in the pen with the whole flock and allowed intercourse *ad. lib.* in the usual way.

TABLE No. 6.—Showing fertility, egg yield, and hatching as season advanced.

Date.	No. of hens laying to date.	Per cent laying.	Eggs set.	1st Test.			2nd Test.		Total hatched.	Per cent fertile.	Per cent fertile hatched.	Per cent total eggs hatched.
				Infertile.	Blood rings.	Left in.	Dead germs.	Left in.				
Mar. 15.....	25	56·8	30	Nil.	2	28	4	24	10	100·0	33·3	33·3
Mar. 30.....	34	77·3	55	12	4	39	6	33	25	78·2	58·1	45·4
Apr. 7. . .	38	86·4	106	13	4	89	10	79	51	87·7	54·6	48·1

It will be seen from the above table that the increased number of hens laying at the third test in no way told against the percentage of chickens hatched out; on the contrary, improvement is shown all round.

Though the percentage of fertility was highest when only 56.8 per cent of the hens were laying the total hatch was only 33.3 per cent. When 86.4 per cent of the pen were laying the total hatch was 48.1 per cent, and the fertility 87.7 per cent. The season being further advanced and the birds getting more out-of-door exercise would improve the fertility and account for the better showing in the last hatch.

This test shows a fair hatch with a number of hens that has generally been considered more than it was advisable to mate with the average male.

FERTILITY AFTER BROODINESS.

An investigation to ascertain if without mating again, fertility could be traced in eggs laid after hen had been broody for any length of time.

TABLE No. 7.—Fertility, if any, after setting and brooding for periods mentioned.

Hen No.	Eggs set.	Breed.	Broody.	First egg laid after setting and brooding.	No. fertile.
54	14	Barred Plymouth Rocks	April 1	June 13	0
42	9	Barred Plymouth Rocks	" 9	" 15	0
65	10	Buff Orpingtons	" 20	" 13	0
98	3	White Rocks	" 11	" 20	0

In all thirty-six eggs were set from four hens, but in no instance could the slightest trace of fertility be found.

COOLING EXPERIMENT.

One side of the Mammoth Incubator, eight trays, was used for a test in cooling the eggs for longer and shorter periods while hatching. The room in which the experiment was made had an average temperature for the three weeks of: First week 73·2°; second week, 69.0°; third week, 74.3°. The average relative humidity of the room was: First week 63·3 per cent; second week, 61·8 per cent; third week, 71·0 per cent. No moisture was supplied inside the machine.

The eggs on several trays were cooled each day as follows, the time being in minutes; where "O" appears the eggs were taken out, turned and put right back into the incubator without any cooling.

TABLE No. 8.—Cooling Experiment.

	1st Week.		2nd Week.		3rd Week.	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M
Tray No. 1	0	0	0	0	0	0
" " 2	0	5	0	10	0	15
" " 3	0	10	0	15	0	20
" " 4	0	10	0	20	0	30
" " 5	5	5	5	5	5	5
" " 6	5	5	10	10	15	15
" " 7	5	5	15	15	20	20
" " 8	0	5	0	10	0	15

In addition to the cooling shown for tray No. 8, it was left out on the seventh day for two hours in a temperature of 68°, on the fourteenth day for five hours in a temperature of 69°, and on the nineteenth day for one hour in a temperature of 71°. This was done to see what effect it would have if a tray was left out for several hours, as is sometimes done by accident.

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TABLE No. 9.—Cooling Experiment.

Tray No. 1.	Eggs Set.	1st Test. Infertile.	1st Test. Blood Rings	1st Test. Left in.	2nd Test Dead Germs	2nd Test Left in.	Hatched.	Cripples.	Dead in Shell.	% Fertile Hatched.	% Total eggs Hatched.	Net Weight.	Av. weight each Chick.	Condition.
												Oz.	Oz.	
W. Leghorns	51	9	6	36	12	24	13	....	11	31	18	....	....	Good.
B.P. Rocks	8	1	....	7	1	6	4	....	2	57	50	....	....	
Buff Orps	7	....	....	7	4	3	1	....	2	14	14	....	....	
White P. Rocks	4	..	1	3	2	1	....	....	1	....	....	....	..	
	70	10	7	53	19	34	18	....	16	34	26	22	1·22	
Tray No. 2.														
W. Leghorns	51	8	2	41	7	34	26	....	8	63	51	....	....	Good.
B.P. Rocks	8	1	....	7	....	7	3	....	4	43	38	....	....	
Buff Orps	7	2	....	5	2	3	1	....	2	20	14	....	....	
White P. Rocks	4	1	..	3	2	1	1	....	....	33	25	....	....	
	70	12	2	56	11	45	31	....	14	55	44	36	1·16	
Tray No. 3.														
W. Leghorns	51	8	3	40	8	32	20	....	12	50	39	..	....	Good.
B.P. Rocks	8	1	....	7	2	5	2	....	3	29	25	....	....	
Buff Orps	7	1	....	6	1	5	2	....	3	33	29	...	....	
White P. Rocks	4	3	....	1	....	1	....	....	1	....	....	....	....	
	70	13	3	54	11	43	24	....	19	44	34	30	1·08	
Tray No. 4.														
W. Leghorns	51	9	5	37	6	31	20	....	11	54	39	....	....	Good.
B.P. Rocks	8	1	...	7	1	6	3	....	3	43	38	..	...	
Buff Orps	7	2	....	5	2	3	1	....	2	20	14	....	....	
White P. Rocks	4	1	...	3	2	1	....	....	1	...	....	....	....	
	70	13	5	52	11	41	24	....	17	46	34	29	1·21	
Tray No. 5.														
W. Leghorns	51	7	3	41	11	30	20	...	10	49	39	....	....	Good.
B.P. Rocks	8	1	....	7	1	6	2	...	4	29	25	....	....	
Buff Orps	7	2	....	5	1	4	2	....	2	40	29	....	....	
White P. Rocks	4	2	....	2	....	2	....	....	2	....	...	....	....	
	70	12	3	55	13	42	24	....	18	44	34	30	1·08	
Tray No. 6.														
W. Leghorns	51	5	4	42	11	31	17	....	14	40	33	....	....	Good
B.P. Rocks	8	....	....	8	2	6	2	....	4	25	25	....	....	
Buff Orps	7	2	....	5	1	4	1	...	3	20	14	...	....	
White P. Rocks	4	3	..	1	1	....	....	....	....	....	....	....	..	
	70	10	4	56	15	41	20	....	21	36	29	25	1·25	
Tray No. 7.														
W. Leghorns	51	10	1	40	6	34	17	....	17	42	33	....	....	Good.
B.P. Rocks	8	....	..	8	....	8	4	....	4	50	50	....	....	
Buff Orps	7	3	....	4	2	2	1	....	1	25	14	....	....	
White P. Rocks	4	1	1	2	1	1	1	....	....	50	25	....	...	
	70	14	2	54	9	45	23	....	22	43	33	29	1·26	
Tray No. 8.														
W. Leghorns	51	9	5	37	7	30	15	...	15	41	30	....	....	Poor.
B.P. Rocks	8	....	....	8	....	8	4	....	4	50	50	....	....	
Buff Orps	7	3	....	4	1	3	....	....	3	....	....	....	....	
White P. Rocks	4	2	....	2	....	2	2	....	....	100	50	..	....	
	70	14	5	51	8	43	21	....	22	41	30	25	1·19	

NOTE.—The general hatch was poor, being due to the late season in which the test was made.

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Tray No. 2 was the earliest to pip, and gave the highest percentages for fertile eggs hatched and for total eggs set. The average weight for each chick was one-tenth ounce below the highest average weight obtained in this experiment, which difference may be accounted for by the fact that the chicks were all weighed at the same time, and tray No. 2, being the first hatched, would have lost more weight than those chicks hatched later. All chicks were in good condition except those from tray No. 8. Tray No. 1 hatched the fewest chicks and also had the most blood rings. Trays Nos. 3, 4, and 6 were the third to pip and all pipped together.

The tray that gave the best results was cooled as follows:—

First week: a.m., nil; p.m., 5 minutes
Second week: a.m., nil; p.m., 10 minutes.
Third week: a.m., nil; p.m., 15 minutes.

This gives a total cooling for the period commencing the third day and closing on the evening of the eighteenth day of 155 minutes or 2 hours and 35 minutes.

The "accidental" cooling for several hours did not improve the hatch, but the opposite. Too much cooling at any one time, or too little cooling, is not good for the hatch.

This experiment is being duplicated, and further results will be reported another time.

INDIAN RUNNER DUCK EGGS FOR TABLE USE.

Much has been said about the value of Indian Runner ducks for egg production and their eggs for table use, and as some farms may be better adapted to ducks than to hens an endeavour was made to find out what the consumer thought of these eggs as a substitute for hen eggs for table purposes.

This Division supplies new-laid eggs to about thirty families on the Experimental Farm and in the city of Ottawa, and in these weekly shipments a few of the duck eggs from time to time were included with the hen eggs and a note asking the customer's opinion was also enclosed.

All the customers that reported, with the exception of one, stated that they would just as soon eat the Indian runner duck egg as the hen egg, and in some cases the customers went so far as to say that the duck eggs were to be preferred because of the extra size. It would therefore appear that Indian Runner duck eggs might substitute hen eggs for table use. It was noted that there was an absence of the strong so-called duck flavour to the eggs. There was, however, what might be called a rich or buttery flavour that added to rather than detracted from the palatability.

As a layer the Indian Runner will no doubt lay more eggs than other varieties of ducks, but the ducks used in this experiment were not phenomenal layers though they layed well during the winter months. The shell is white and, when cleaned, presents a very attractive appearance.

GREEN DUCKS FOR MARKET.

This experiment was to determine the profit on ducks hatched in incubators, reared in brooders, and sold on the local market at 10 to 12 weeks old, or just when the first growth of feathers was completed.

The eggs were purchased from a farmer expressly for this experiment, but the parent stock had evidently been a little carelessly handled, as at least 50 per cent of the ducklings showed signs of a "cross" of Indian Runner blood.

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This undoubtedly rendered results less profitable, as pure Pekins would have averaged nearer 6 pounds or even more at 10 weeks.

This hatch of ducklings, after having been fed the ration given below during the first two weeks or critical period of raising, were forced along to marketable size and fitness by heavier feeding, due probably to the exceptionally cold weather experienced at the beginning of the hatching season, the strength of the germs seemed unusually weak for ducklings, and the hatch correspondingly small, though the fertility was well up to the average.

Ration.—Fed fairly wet. Stale bread thoroughly soaked in skim-milk (sweet or sour) and mixed with 2 parts bran 2 parts shorts 2 parts corn meal half part meat meal or beefscrap and half part sand. After two weeks the bread was gradually decreased and the corn meal increased. After the fourth week the bran and shorts were gradually decreased and the corn meal increased until by the eighth week the ration was one part shorts, three parts corn meal, half part beefscrap and half part sand.

It appeared, however, that this ration, one part shorts, three parts corn meal, half part beefscrap, was a little too heavy for "finishing," as a few of the ducks appeared to be "stalled" and off their feed.

Probably better results would be secured by substituting at the eighth week the following: Half part bran, half part shorts, two parts corn meal, half part beefscrap and half part sand.

Water was not kept constantly before them but it was liberally supplied at feeding time, and in the early part of the season when the water was very cold the chill was taken off.

Through not applying this rule at the first few days' feeding, disaster resulted and accounted for a heavy death rate during the first two weeks.

Too much stress cannot be laid on the care for the first week, and due regard paid to the water, particularly early in the spring when the water is very cold.

In raising subsequent hatches of young ducklings of many varieties, not a single death occurred, through close observance of this rule, and the ducks proved themselves to be the easiest handled and the hardiest of the fowl raised during the spring and summer of the year.

TABLE No. 10.—Showing gain in weight of market ducks at 2, 4, 6, 8, and 10 weeks. Set March 14, hatched April 10.

No. of Ducks.	Weight		Average Weight.		Gain.		Average Gain.		Period.	Remarks.
	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz		
71	19	6	..	4·36	...	... ...	.....		2 weeks	First weighing at 2 weeks of age.
66	53	0	..	12·8	33	10	..	8·1	4 "	
66	148	0	2	3·8	95	0	1	7	6 "	
66	226	8	3	6·9	78	8	1	2·9	8 "	
66	289	0	4	6·4	63	..	..	15·3	10 "	
66	310	8	4	11·2	21	8	..	5·1	10 " 3 days.	

TABLE No. 10.—Showing feed consumed, cost, and price realized at Ottawa June 27.

FEED CONSUMED.

Bran	160	pounds at	$1.35	per	100	pounds	=$2.15
Shorts	200	" "	1.45	"	"	"	= 2.90
Corn meal	501	" "	1.95	"	"	"	= 9.75
Beef scrap	95	" "	4.00	"	"	"	= 3.80
Bread	30	" "	2.00	"	"	"	= .60
Milk	1,000	" "	25	"	"	"	= 2.50
Total							$21.70
Sixty-six ducks, 310 pounds net, marketed June 27 at 20 cents per pound							=$62.00
Total cost of feed							21 70
Profit over cost of feed							$40.30

Feed to make pound of duck, 3.18 lbs.

THE DUCK MARKET.

The best time to sell ducks intended for market is just when their first feathers are complete. This is usually from 8 to 12 weeks of age, depending on the breed, feed, and season. Ducks of this kind are known on the market as "green ducks," and no matter what the season, ducks should always be marketed "green."

As soon as the first coat of feathers is full the ducks begin to grow another crop, and if allowed to remain even a few days too long they will be found to have pins, and it will take about 6 weeks to get rid of them, during which time the increase in weight is very slight as most of the feed goes into feathers instead of meat.

With the exception of some of our large cities there appears to be only a limited demand for green ducks. A few large wholesale firms, however, say they will take any quantity of ducks marketed in good condition at this age and at any time. We preferred to sell our birds in Ottawa. Several dealers said there was no demand for ducks at this time of the year, but our experience was that wherever any of these ducks went there was a call for more. This will doubtless be the case anywhere; give the dealer or consumer a good article and more will be wanted.

SHIPPING EGGS FOR HATCHING BY PARCEL POST AND EXPRESS.

Upon the introduction of the Parcel Post system it was decided to test this method of shipping eggs for hatching and with this end in view several settings were sent from the Central Farm by parcel post and express to the superintendents at the branch Farms, who were also instructed to ship settings in return.

In each case the method of packing was identical. The eggs wrapped separately in paper with a thin layer of excelsior at the top and bottom of an ordinary corrugated cardboard shipping box such as is supplied by any of the poultry supply houses. The condition on arrival, cost of shipping, and the time the package took to reach its destination has been carefully noted and is shown in Table No. 12.

TABLE No. 12.—Eggs for Hatching shipped to and from Ottawa by Express and Parcel Post.

From	To	Parcel Post.			Express.		
		Time.	Condition.	Cost.	Time.	Condition.	Cost.
		Hrs.		Cts.	Hrs.		Cts.
Nappan, N.S.....	Ottawa.....	72	Good.....	28	72	Good.....	45
Brandon, Man.....	Ottawa.	72	"	24	72	"	45
Ottawa..... ...	Nappan, N.S.....	72	Good, one broken.	28	72	"	45
Ottawa.....	Brandon, Man....	72	Good.....	22	144	" ..	45
Total.....	.....	288	.....	1 02	360	.....	1 80
Average.....	....	72	.....	25½	90	.....	45

NOTE.—The egg broken in the shipment to Nappan had a thin shell, and was hardly the result of the shipping.

The average time of the four shipments was: Parcel post 72 hours, and the cost 25½ cents, as against 90 hours and 45 cents for express.

The length of time in the delivery of the eggs expressed to Brandon was owing to the fact that they arrived on Saturday and Monday was a holiday so that it was Tuesday before they were delivered. The two lots of eggs arrived by the same train and the eggs by parcel post were delivered the same evening that they arrived.

The results of other shipments were not received in time for this report, but the indications are that for one setting packages the parcel post is quicker, cheaper, and apparently quite as safe, though it must be remembered that in case of loss there is no recourse.

THE VALUE OF SCREENINGS AS OBTAINED FROM THE PORT ARTHUR AND FORT WILLIAM ELEVATORS FOR POULTRY FEEDING.

This experiment was undertaken at the suggestion of Mr. George H. Clark, Seed Commissioner, and we are indebted to him and to Mr. J. R. Dymond, in charge of the Seed Laboratory at Calgary, for the sample of seeds furnished for the experiment. Dr. Frank T. Shutt, Dominion Chemist, also co-operated in the experiment and made the analysis of the different grains fed. Dr. Chas. H. Higgins, Dominion Pathologist, made a post mortem examination of all the birds.

The purpose of the experiment was to find out if this material, the bulk of which is now being sent to the United States, was valuable for poultry food, and also if any of the weed seeds were poisonous.

The feed as it was received here was (1) scalpings, (2) screenings, (3) wild buckwheat, (4) black seeds. The black seeds were again subdivided into (5) lamb's quarters, (6) wild mustard, and (7) tumbling mustard.

Eighteen different rations were used. These rations as fed were:—

Ration No. 1.—Scalpings.
" 2.—Scalpings and mash.
" 3.—Screenings.
" 4.—Screenings and mash.
" 5.—Black seeds.
" 6.—Blacq seeds and mash.
" 7.—Black seeds boiled.
" 8.—Black seeds and mash boiled.
" 9.—Wild mustard and corn.
" 10.—Wild mustard, and corn, and mash.
" 11.—Tumbling mustard.
" 12.—Tumbling mustard and mash.
" 13.—Wild buckwheat.
" 14.—Wild buckwheat and mash.
" 15.—Lambs quarters.
" 16.—Lambs quarters and mash.
" 17.—Mash.
" 18.—Mash.

NOTE.—The mash was equal parts corn meal and finely ground oats. The wild mustard was too oily to grind alone, and an equal part of corn was added.

The Birds.—Seventy-two birds were used for this experiment. They were healthy and vigorous cockerels from 6 to 8 months old, divided as near as possible, according to weight and breed, and weighed at the beginning and at the end of the period.

The feeding.—The feeding was done in crates, the regulation size, four birds to a compartment, and each compartment was separated so that the feed intended for one lot could not be taken by any of the other birds. The birds were all fed four days on a mash of equal parts corn meal and finely ground oats, mixed with buttermilk. This was to get them used to confinement, after which they were given their experimental rations.

They were fed twice a day and after taking all they would eat, that which remained in the trough was scraped out clean. Where the birds would not take to the mash at first, they were left for two or three days to see if they would eat, but in some cases they would have starved to death rather than eat the feed. When the bird refused for two or three days the crammer was used once or twice a day as was thought best.

It was noted that though some of the rations were refused by the birds and it became necessary to use the crammer that after two or three days they seemed to take to the feed and in some cases ate fairly well.

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TABLE No. 13.—Showing gain or loss on different rations, feed consumed and condition of birds after a period of feeding.

Ration.	Weight at beginning of experiment.		No. of days on feed.	Feed consumed.		Weight at close of experiment.		Total gain or loss.		Average daily increase or loss per bird.	Condition of birds to date.
	Lb.	Oz.		Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Oz.	
No. 1 Scalpings	18	11	16 days	21	8	24	4	+5	5	+1·32	Bright.
" 2 Scalpings and mash	19	7½	16 "	22	0	24	15	+5	7½	+1·36	Fairly bright.
" 3 Screenings	21	7½	16 "	14	10	22	5	+0	7½	+0·11	"
" 4 Screenings and mash	20	10½	7 "	4	8	19	8	−1	2½	−0 64	"
" 5 Black seeds	20	3½	8 "	4	13	18	2	−2	1½	−1·05	"
" 6 Black seeds and mash	21	3	16 "	11	4	21	14½	+0	11½	+0·18	Dull,
" 7 Black seeds (boiled)	20	6½	16 "	16	11	20	½	−0	6	−0·09	"
" 8 Black seeds and mash (boiled)	20	3½	16 "	21	15	22	13½	+2	10	+0 65	Fairly bright.
" 9 Mustard and corn	19	0	9 "	4	9	18	1	−0	15	−0·41	"
" 10 Mustard and corn and mash	19	9½	9 "	6	0	19	7	−0	2½	−0·05	"
" 11 Tumbling mustard	20	1	16 "	5	2	17	12½	−2	5½	−0·58	Dull.
" 12 Tumbling mustard and mash	20	14½	16 "	9	14	20	3	−0	11½	−0·19	"
" 13 Wild buckwheat	20	6	6 "	11	8	23	6½	+3	0½	+2·02	Bright.
" 14 Wild buckwheat and mash	19	10	6 "	10	9	22	12½	+3	2½	+2·10	"
" 15 Lambs' quarters	20	14	11 "	4	6	18	7	−2	7	−0·84	Dull.
" 16 Lambs' quarters and mash	19	4	16 "	10	9	16	8	−2	12	−0 68	"
" 17 Corn and oats	20	11	16 "	19	8	26	15	+6	4	+1·56	Bright.
" 18 Corn and oats	20	7	16 "	19	8	25	15½	+5	8½	+1·54	"

NOTE.—The tables in this experiment are so numerous that it has been thought wiser to give only a summary of the results here, and prepare a bulletin showing these in detail.

Ration No. 1.—Scalpings. The larger material such as broken and shrunken wheat and the larger weed seeds contained in screenings. Ground fine and mixed with butter-milk. The birds did not take to the food very readily and from the fourth day had to be crammed one meal a day for four days when they seemed to acquire an appetite for the ration and fed very well until the end of the feeding period.

Ration No. 2.—One part scalpings, as in No. 1 ration, and one part mash. The birds took to the mash only fairly until the fourth day when cramming was resorted to once a day until the ninth day, when they took to the mash fairly well.

Ration No. 3.—Screenings as sold from the elevators. This contained a good deal of wheat and other seeds and was composed practically of everything that is sifted out of the wheat in the way of small grain and seeds, both good and bad. The birds did not take to this feed very readily, and from the fourth to the seventh day, inclusive, were crammed, after which they ate enough to keep alive.

Ration No. 4.—Screenings and mash. This consisted of one part screenings, as No. 3 and one part mash. The ration was not palatable and on the fourth, fifth, and sixth days the birds were crammed, after which they ate a little of the feed until the end of the experiment.

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Ration No. 5.—"Black seeds." The finer weed seeds remaining after the scalpings have been removed from the screenings. The birds did not take to the ration at all, and on the third day cramming was commenced and continued until the ninth day, when they ate of their own accord.

Ration No. 6.—One part black weed seeds as per No. 5, and one part mash. The mash did not seem to improve matters, and the cramming was about the same as in No. 5.

Ration No. 7.—The same as No. 5 except that it was boiled. The boiling rendered it more palatable, and the birds ate fairly well throughout the period, without cramming.

Ration No. 8.—One part "Black seeds" and one part mash, boiled. The birds took to this mash just about the same as in No. 7, though they grew a little more fond of it towards the latter part of the feeding experiment. No cramming was necessary in this lot.

Ration No. 9.—Wild mustard and corn. The birds did not take to this, and on the third day cramming was started and continued until the end.

Ration No. 10.—Wild mustard and corn, one part and one part mash. The birds did not take to this any more readily than to No. 9, and cramming was commenced on the second day and was continued right through.

Ration No. 11.—Tumbling mustard. This was no more palatable than the wild mustard, and cramming had to be resorted to throughout the whole feed.

Ration No. 12.—Tumbling mustard and mash. Practically the same experience in feeding this with similar results.

Ration No. 13.—Wild buckwheat. The most palatable ration of the whole experiment. The birds were eager for their food and ate very well throughout the whole period, with consequently high increase, as shown by table above.

Ration No. 14.—Wild buckwheat one part and mash one part. The birds ate very well of this, though no better than they did in No. 13, and in fact the No. 13 ration seemed to be more palatable throughout the period than when half mash was included.

Ration No. 15.—Lambs quarter. The chicks did not take to the lambs quarter, and cramming had to be resorted to on the second day and continued throughout the period.

Ration No. 16.—Lambs quarter and mash. Practically the same results as in No. 15.

Ration No. 17.—Mash. The feed was palatable, the birds ate well and made good gains.

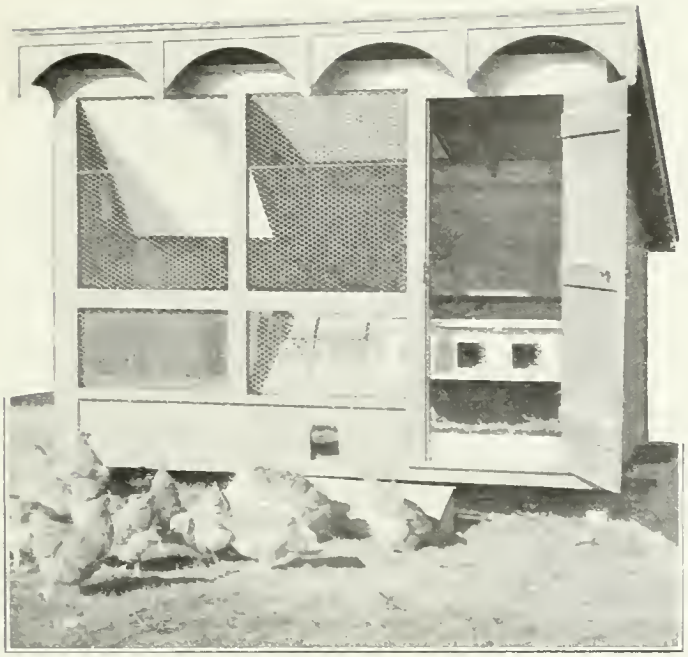
Ration No. 18.—Same as No. 17. The comparative palatability of Nos 17 and 18, when compared with the buckwheat Nos. 13 and 14 would leave, if anything, the preference in favour of the buckwheat over the corn and oat mash.

SUMMARY.

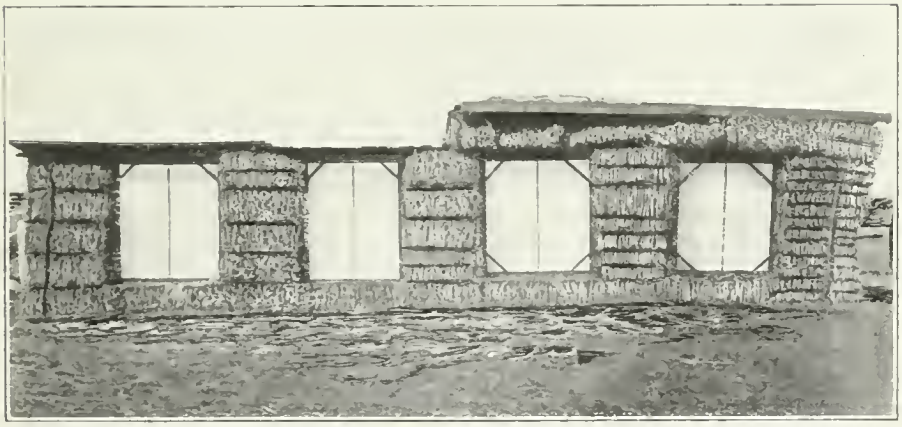
The presence of "Black seeds" in the ration not only makes it unpalatable but unprofitable as well, with these eliminated the ration is good.

The wild buckwheat makes a very desirable food, and as it is comparatively easy to separate it from the whole grain and the "Black seeds," it should make a valuable fleshing food for poultry.

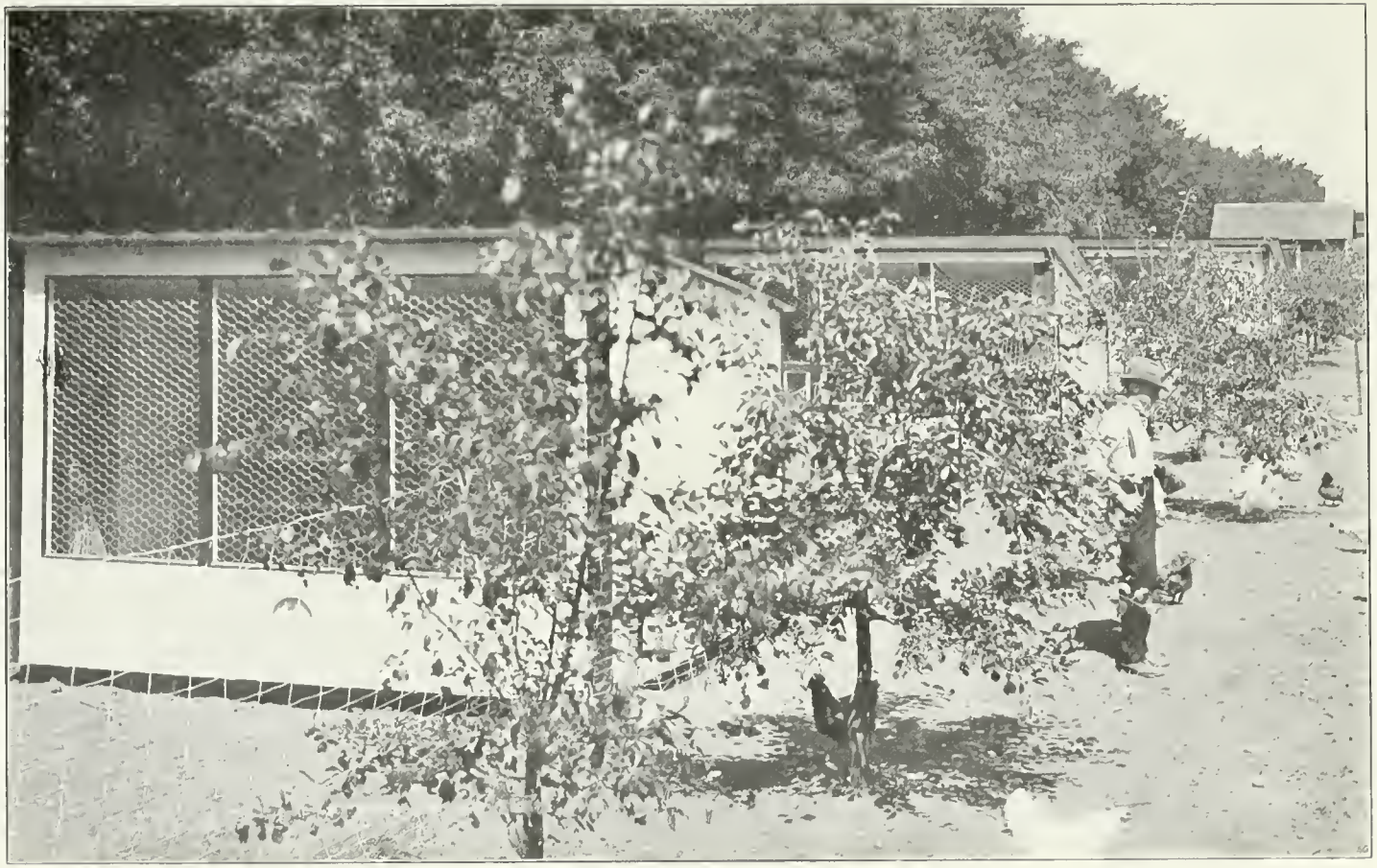
Loss in weight was experienced from feeding rations Nos. 5, 15, 16, 4, 11, 9, 12, 7, 10, and the proportion of loss occurred in the order named, the heaviest loss being



Moveable Colony House. This house gave good results throughout the cold winter of 1913-14.



Straw Poultry House, Lacombe, Alta. This shows three different roofs, shingle, board and straw, the shingle being the most satisfactory.



Colony Houses, Indian Head, Sask.

Photographs of ducks used in the market experiment, showing them at 4 weeks, 6 weeks and 8 weeks of age.

No. 5. The remainder showed relative high gains as follows: 14, 13, 17, 18, 2, 1, 8, 6, and 3.

The cheapest gains, according to the number of pounds required to make one pound of gain were: First, No. 14, requiring 3·4 pounds of feed for 1 pound of gain. Then came Nos. 13 and 17 equal, with, 3·9 pounds of feed to make a pound of gain. after this No. 18, with 4·5 pounds each, and No. 1 with 4·7 pounds.

The most palatable foods were Nos. 13, 14, 17, 18, 2, and 1 in order named, and the most unpalatable were the mustards and the lambs quarter. In fact, any ration that contained either of the mustards in small or large proportion, or the lambs quarter, if not boiled, were so distasteful that the birds would not eat them until after they had been crammed, and then only sparingly.

Unfortunately only a small sample of feed in the case of rations Nos. 9 and 10 (mustard) and 13 and 14 (wild buckwheat) were supplied, but in both instances it was ample to prove its purpose.

On the mustards the birds failed so rapidly that it was useless to continue the feeding of this ration beyond the time stated.

And in the case of wild buckwheat, Nos. 13 and 14, the gains were so pronounced and the birds so voracious for the feed that there was no disputing the desirability of the ration for fattening or fleshing.

On ration No. 4 one bird died on the seventh day, and feeding was discontinued on this account, the ration being palpably unsatisfactory. Ration No. 5 proved equally so, one bird dying on the fifth day, when the feeding of the mixture was stopped.

In the instance of No. 15, the feed was discontinued on the eleventh day on account of the death of one bird and the result of continuing further being obvious.

We note, however, from the pathological analysis that in no instance did death result from "poison," but rather from mal-nutrition.

And although the mustards, Nos. 9 and 10, were so strong as to scald or blister the human skin the birds kept in fairly good health and were the speediest to recover and put on flesh when their feed was changed.

The different pens were kept on their respective diets for periods that were considered sufficient to prove their value or otherwise, and were then, if necessary, brought back to their good health and marketable fitness on a fattening ration of equal parts corn meal and ground oats mixed with skim-milk.

It was remarkable to note in this stage of the feeding that the birds that suffered most severely, or where the ration might have been expected to prove fatal, as in the case of the mustards, the "rebound" was very rapid.

It was clear that the mustards, far from being poisonous, had had a stimulating effect on the digestive organs. No harm was therefore done in feeding the screenings, either collectively or individually, though no profit would accrue in some instances.

The gains, however, were remarkable in the case of Nos. 13 and 14, and if it is possible to obtain screenings in some parts of the West where wild buckwheat predominates or exists in large quantities, it is no doubt an excellent medium for the preparation of a fattening ration of undeniable usefulness.

Where it was possible to obtain an opinion on the merits of the different rations, as to their effect on the palatability of the meat for human consumption, it was reported that though in some cases there was a marked difference in flavour, in no case was it actually objectionable.

Nos. 13 and 14 again show up advantageously in this respect as no noticeable difference could be traceable from this ration, the flavour of the meat being apparently quite satisfactory.

It is evident that where the small "black seeds" were eliminated, as in No. 1, scalpings, the ration is both palatable and fulfils its mission, and can be fed very profitably on account of its low cost.

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RATIONS FOUND SATISFACTORY BY THIS DIVISION.

The following rations have proven satisfactory at the Central farm, but any one or all of them may be varied according to local conditions and the quality of the various feed stuffs. The feeder should observe the effect of the ration and exercise judgment as to the quantity of the various ingredients to use.

RATION FOR CHICKS.

Do Not Feed Too Soon.—When the chick is hatched it has a sufficient supply of nourishment, in the yolk of the egg, to last it for several days, and what the chick requires for the first few days is *not feed* but *warmth* and *rest.*

A Little Sand or Grit First.—When the chicks are removed to their brooding quarters there should be some coarse sand or fine chick grit scattered where they can have free access to it. They should then be left until they show positive signs of hunger, which would be between the second and third days after hatching. They may then be given some bread crumbs that have been *very slightly* moistened with milk, this may be scattered on clean sand or chick grit. If being brooded by a hen she will see that no food is allowed to lie around, but if in a brooder, that part of the food that the chicks do not pick up in a few minutes should be removed, as nothing in feeding causes so much trouble as leaving food of that nature around until it is sour.

Feed for the First Ten or Twelve Days.—The following daily ration of five feeds given about two hours and a half apart and continued from the time the chicks are two to three days out of the shell until ten or twelve days of age may be altered or adapted to suit conditions:—

First feed.—Dry bread crumbs slightly moistened with milk.
Second feed.—Finely cracked mixed grains or commercial chick feed.
Third feed.—Rolled oats.
Fourth feed.—Dry bread crumbs moistened with milk.
Fifth feed.—Finely cracked mixed grains.

In addition to the above, give the chicks daily a little green food, such as grass, lettuce, sprouted oats, etc. Do not have the moistened bread sloppy but in a crumbly state, and during this period let the chicks on to fresh soil or grass every day if possible.

Feed After Ten or Twelve Days.—After the chicks are ten days to two weeks old, coarser foods may be allowed. The infertile eggs may be boiled and mixed with a mash food and the bread and milk discontinued. Hoppers in which are put cracked grains and dry mash or rolled oats may be placed where the chicks can have free access to them. As soon as they become accustomed to the hoppers all hand feeding, except the mash, may be discontinued. If the chicks are on range it will be found that after a time they will get careless about coming when called, at which time the mash may be dropped and dependence placed entirely on the hopper feeding.

Place grit and water, also a dish of sour milk if possible, where the chicks will have free access to them. Nothing provides animal food in better form than does milk, the chicks like it and thrive on it.

LAYING RATION FOR DUCKS.

By measure,	8 to 10	parts	corn chop
	8 to 10	"	bran
	3 to 5	"	middlings according to quality.
	2 to 3	"	beef scrap
	10 to 15	"	clover or other succulent green food.

OTTAWA.

The flock should be brought to full feed gradually, care being taken not to feed too heavily on beef scrap at first, as it is liable to scour the birds. They should be fed twice a day, night and morning, all they will eat. After laying is fairly well started, the bran may be reduced somewhat and the corn chop increased.

RATION FOR DUCKLINGS.

Stale bread, soaked in milk until it has taken up all it will, then stiffen to a fairly moist mash by adding bran two parts, corn meal two parts, middlings two parts, beef scrap half part, and coarse sand half part, and a liberal quantity of finely chopped clover, lambs quarters, dandelions, or any other tender succulent green food. The ducklings should be fed five times a day for the first three or four weeks; four times a day until six weeks; three times until ten weeks, when they should either be marketed or put on range for breeders, in which case they should be fed twice a day until it is desired to start them laying.

After the ducklings are about a week old, the proportion of bread may be reduced. If the ducklings are for market purposes this ration may be continued for four or five weeks and then corn meal should be gradually increased until, at finishing time, they should be getting about two parts corn meal to one part bran and middlings. If the ducklings are intended for stock purposes, when the bread is reduced after the first week it is advisable to increase the middlings about one part. If milk is not obtainable, water may be used to moisten the mash, and if stale bread can not be purchased at a sufficiently low price, use two parts middlings instead of one.

Many people are under the impression that ducklings require water to swim in; this is a mistaken idea, as they will do just as well without it, in fact for the first few weeks they will do much better. A liberal supply of drinking water should be given them at feeding time, but it should be given in such dishes that it will be impossible for the ducklings to get into them.

RATION FOR GOSLINGS.

The same ration as advised for ducklings may be fed goslings. They should be fed three times a day and should have the run of a plot of tender grass or clover and be liberally supplied with drinking water.

RATION FOR TURKEY POULTS.

The same mash advised for ducklings may be used for the poults, but be sure to get enough tender green food into it. If you have not been accustomed to raise turkeys you will be surprised at the way they will pick out all the tender greens first. In addition to this mash they may be given clotted sour milk or curd and finely cracked grains.

They should be given a good dry run and kept out of long grass until the dew is off it. After the first few weeks they may be given their liberty and fed morning and evening to ensure their return. On the approach of a storm they should always be got under cover.

OTTAWA.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF SUPERINTENDENT, J. A. CLARK, B.S.A.

POULTRY.

A beginning was made this year toward the establishment of a poultry plant at this Station. A Prairie State incubator was filled with 120 Barred Plymouth Rock eggs on April 30, 1913; from this setting there were forty-one matured birds on November 1; eleven cockerels and thirty pullets. These pullets began laying November 21. They continued laying well throughout the winter. The second hatch came out on June 17, from bred-to-lay Barred Plymouth Rock stock; 108 eggs were set that gave forty-five matured birds November 21; twenty-two cockerels and twenty-three pullets. The pullets began laying December 8. To determine what could be done with a late hatch, 130 White Leghorn eggs were set June 25. On December 1 there were forty-three birds from this lot, nineteen cockerels and twenty-four pullets. These pullets began laying January 7, 1914.

The best cockerels were sold for breeding purposes at $2 each. The balance were crate-fattened and sold at 12 cents and 14 cents per pound.

Three Barred Rock cockerels and one White Leghorn cockerel were purchased to mate with the four pens of pullets.

The equipment at the close of the year consisted of four colony houses on skids. Two were of the Macdonald type, 12 feet by 8 feet, two with cotton fronts and shed roofs 12 feet by 10 feet. One Simplex Brooder house 18 feet by 10 feet, and two small colony houses for maturing stock, a Tamlin incubator and other poultry supplies were added, so that the poultry plant has now good equipment for a limited number of birds.

EXPERIMENTAL FARM NAPPAN, N.S.

REPORT OF SUPERINTENDENT, W. W. BAIRD, B.S.A.

POULTRY.

A beginning was made this year in poultry work. Six colony houses of various types were built in the fall of 1913, and into these fifty-seven Barred Rocks, forty-seven White Wyandottes, and twenty-two S. C. White Leghorns were placed. The Barred Rocks and White Wyandottes were purchased in November from good utility stock. The Leghorns are from eggs of a good laying strain that were purchased in May, 1913.

Owing to the fact that it was very late in the fall before we could get the colony houses finished and ready for the fowl, it necessitated the birds being moved from one place to another so late that they did not get to work laying as early as they otherwise would, but the results would indicate that these types of houses should be quite satisfactory for this climate.

The houses all contain the same floor space but the fronts are constructed of varying proportions of glass and cotton and the test is being continued throughout the summer, and more complete data will be available another year.

So far the indications are that the houses with two parts cotton to one of glass are the dryest, and those having part of the front boarded contained the most moisture.

The stock came through the winter in excellent shape, very healthy indeed; though the thermometer dropped as low as 27° below zero, the combs of the Leghorns were the only ones that were touched with the frost, even then not to any appreciable extent, and it did not appear to effect the production of eggs.

Since last year two more incubators have been purchased, these at present are being run in the cellar of the Superintendent's house.

The brooders being used are small individual hovers placed in colony houses.

EXPERIMENTAL STATION, KENTVILLE, N. S.

REPORT OF SUPERINTENDENT, W. SAXBY BLAIR.

POULTRY.

POULTRY HOUSES.

Acting under the direction of the Dominion Poultry Husbandman, seven colony houses, 8 by 12 feet in size, were erected during the late summer.

Two houses were constructed with a peaked roof, and the top above the eaves was filled with straw after the ceiling had been slatted over with boards 4 inches wide placed 1 inch apart. This arrangement affords excellent ventilation and gives apparently a very dry house. The other five houses were of the shed-roof type, of which four had the extreme open front with one window of twelve lights of 10 by 12-inch glass in the center of the south side, and at each side of this window, from 20 inches from the floor to the roof protected with a cotton screen only. The screened area in these houses is 34 square feet for each house. Three of the four open-front houses were constructed differently; one was matched lumber covered with tar paper; one 8-inch boards battened; and one matched lumber not covered with tar paper. The fifth house of the shed-roof type was constructed with a door in the center of the south side and a window of twelve lights 10 by 12-inch glass on one side of the door and on the other side a similar opening without glass and covered with cotton.

These colony houses were constructed on a sill 6 by 6 inches placed the width of the building. The sills were rounded at each end so that the houses can be drawn from place to place as may be desired. Scantling 2 by 4 inches was used for the frame and a single thickness of inch matched lumber was used except around the roosts, where the walls were sheathed inside the studding to lessen the draft.

One building 18 by 25 feet had previously been fitted up with three pens. The pens were 8 by 13 feet with a 4-foot passage along the north side. In the south side are three windows, one for each pen, with twenty lights of 10 by 12-inch glass, and on the east and west sides are two windows with four lights of 12 by 24-inch glass. No cotton screens are used in this house. The ceilings are 7½ feet high covered with 4-inch strips of wood 1-inch apart, and over this a 2-foot space is filled with straw.

STOCK CARRIED DURING THE WINTER.

These buildings provide ten pens which accommodate twenty hens and two male birds each. As no stock had been reared at the Station it was necessary to purchase the stock required; accordingly, during November, fifty Barred Plymouth Rock, eighty White Wyandotte, forty Single Comb Rhode Island Red, and twenty White Leghorn hens were purchased, and later four Barred Plymouth Rock, six White Wyandotte, two Rhode Island Red and two White Leghorn male birds were purchased, making a total of 204 birds.

For breeding stock one pen of 20 pullets of the Rhode Island Reds, was used selecting the best of the females, and with these mated the two cockerels. Two pens of twenty each of the best Barred Rocks were selected for breeding in which pullets and the four cockerels purchased were mated. Three pens, twenty each of the best White

Wyandottes, were also used for breeding stock. Of the pens, two were composed of pullets and one of yearling hens, and all were mated with ten cockerels.

The male birds were used alternately, being separated from the flock for two days at a time by putting one into a slatted 2½-foot square coop.

TEMPERATURE OF VARIOUS HOUSES.

Temperature records were kept during the month of February, which is the coldest month, and the mean average maximum and minimum in the five cotton houses, 8 feet by 12 feet, and the large house were as follows:—

	Maximum.	Minimum.
	°	°
No. 1.—Matched lumber, peaked roof with straw overhead, the front having 10 square feet glass and 10 square feet cotton	38·	15·5
No. 2.—Shed roof, tar paper over matched lumber, the front having 10 square feet glass and 10 square feet cotton	39·2	16·2
No. 3.—Matched lumber, shed roof, the front having 10 square feet glass and 16½ square feet cotton	41·2	16·6
No. 4.—Shed roof, open front, 8 inch boards and battens, the front having 14 square feet glass, and 33 square feet cotton	40·1	17·8
No. 5.—Shed roof, open front, matched lumber covered with tar paper, the front having 14 square feet glass and 33 square feet cotton	40·3	16·1
No. 6.—Large house with three pens 8 feet by 13 feet each and passage on north side, slatted top with 2 feet of straw above, shingled sides, three windows, each 3½ feet by 5 feet and two side windows each 2 feet by 4 feet. There were no cotton screens to the windows, and they were closed practically all of February	32·6	22·1
The outside temperature	21·93	6·45

It will be noticed that there was the least variation in temperature in the large house with three pens, and while this was the warmest house some of the birds had their combs frozen slightly. The birds in the open front houses apparently were well hardened off and did not suffer from frozen combs. No. 2 colony house with the shed roof and 10 square feet of glass and cotton was the dampest house of the lot, while No. 1 with the peaked roof and straw overhead but with the same sized openings was perfectly dry.

It would appear that for a dry house, the peaked roof with slatted ceiling and straw overhead is the best; also that the open-front houses with cotton screens are quite satisfactory under our climatic conditions. This is the house with shed roof and one glass window 3½ feet by 4 feet in the south side and the rest of the front from 20 inches up from the floor to the roof covered with cotton screens.

EGG PRODUCTION.

The winter, which was a severe one, was not apparently favourable for egg production. The stock purchased was not secured until late and it was impossible to get stock from an early hatch at a reasonable rate, consequently the pullets did not lay till late.

FEED.

The feeding ration given during the winter was made up of two parts corn, one part whole wheat and one part oats scattered in the litter twice daily before 8 o'clock in the morning and at 3.30 in the afternoon. The feed consumed averaged three quarts

per day per house of twenty-two birds. In addition to this, dry bran and the corn meal screened from the cracked corn mixed in equal parts was before the birds all the time in a hopper of which each house of twenty-two birds consumed 1 pound per day on the average. Grit, oyster shell, charcoal, and meat scrap were in the hoppers all the time within reach of the fowls.

During February and March, green ground bone was fed three times per week at the rate of 1 ounce per bird at each time fed. Green feed was given once a day at noon. Whole turnips were fed during the first part of the winter, followed by sprouted oats. The oats were sprouted in small flats 12 inches by 20 inches and 3 inches deep under the green house bench. The oats were placed about 1-inch deep in the flats after having been soaked to moisten them thoroughly. Two quarts were used to a flat. When the oats had grown 2 or 3 inches tall a flat was divided amongst the ten pens, giving each house a piece 4 inches by 6 inches. This served as an excellent green food, and can be as well sprouted in a warm cellar.

BROODER HOUSE.

During March a brooder house 11 feet by 21 feet was erected, making two 10 feet by 10 feet rooms. This house was built after the Simplex Brooder plan, 4 feet to the plate at each side and a ceiling 6½ feet high in the centre. Two 2 feet by 3 feet windows at the south side of each room were placed for light, and the necessary ventilators constructed. A kerosene oil brooder stove has been set in one of these rooms, which will make it possible to take care of 500 chicks at one time in one room.

INCUBATORS.

Two incubators have been purchased, one a 390-egg Prairie State and the other a 200-egg Tamlin. These machines have been set up in the barn root cellar, which is now clear of roots.

KENTVILLE.

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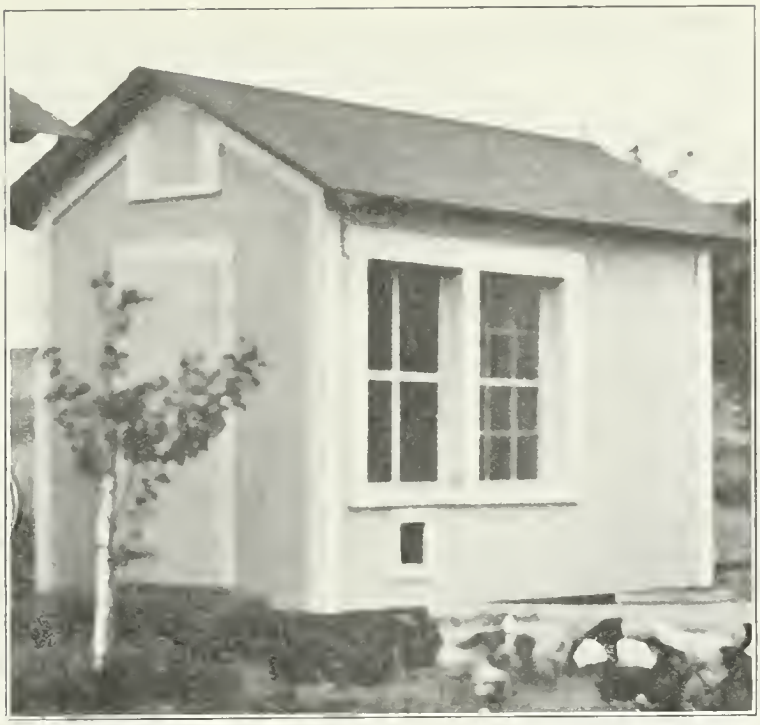
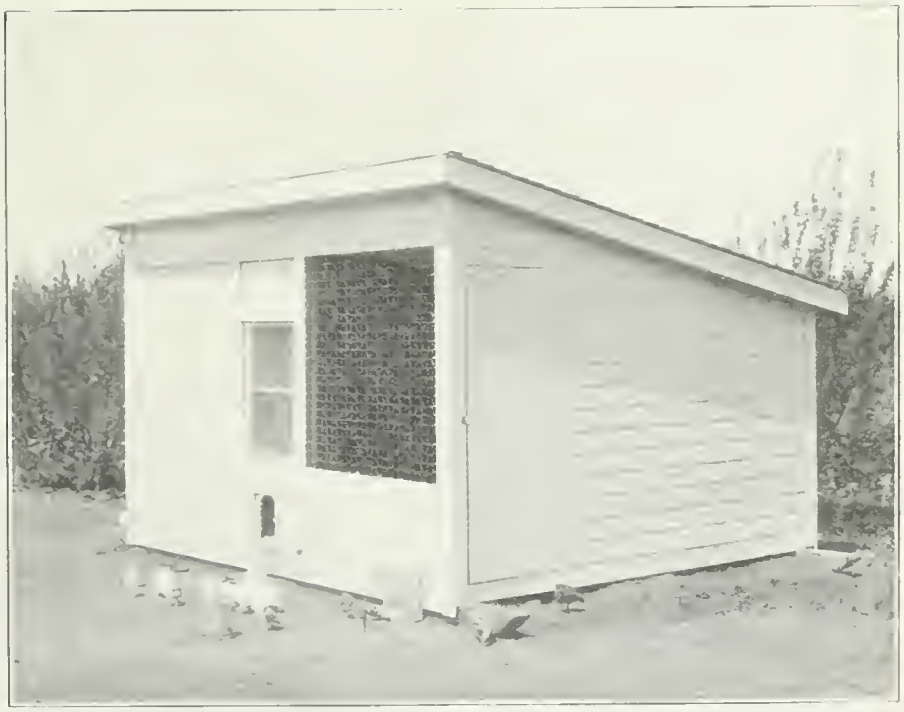
View of Poultry Plant, Kentville, N S.



Colony House, Fredericton. Gave best winter conditions. One window is glass and one cotton.



Colony House used at Brandon. 10 feet x 14 feet. Will accommodate 30 birds. The front view show one cotton screen up and one down.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF SUPERINTENDENT, W. W HUBBARD.

POULTRY.

The spring of 1913 being cold and backward was not conducive to successful hatching and rearing, consequently the first hatch was somewhat late in the season.

A portion of the orchard was enclosed for poultry runs and divided into yards measuring 115 feet by 117 feet. Three breeding pens were mated up, viz., White Wyandottes, Barred Plymouth Rocks, and Rhode Island Reds, and housed in colony houses, two with glass and cotton fronts, and the other with glass only.

Ninety-four chickens were raised, of which 49 per cent were cockerels; some of these were sold for breeding purposes and the rest killed for table; the pullets were rigidly culled and twetnty-five were retained for winter laying and breeding.

The birds were fed wheat first thing in the morning, oats at mid-day, and corn at night; the grain was scattered in the litter at the rate of one quart at each meal for every thirty birds. In the winter a warm mash was substituted for oats at the mid-day meal; a dry mash composed of two parts bran, one part middlings, one part cornmeal, half part cut alfalfa, quarter part ground linseed cake was always before them, as were also beef scrap, oyster shell, grit, and charcoal. A plentiful supply of pure water in clean drinking fountains was also provided for them.

The colony houses were drawn up together for the winter, and the birds came through in a healthy and vigorous condition. Those in the house with glass only getting their combs frozen, while those in the cotton and glass fronts did not suffer from the cold.

Pens 1, 2, 3, and 7 have been mated up to vigorous cockerels, whose dams have good records as layers, and it is hoped that their progeny will demonstrate the importance of having the male descended from good layers. Two incubators have been purchased and will be used during the ensuing season.

EXPERIMENTAL STATION, CAP ROUGE, P.Q.

REPORT OF SUPERINTENDENT, GUSTAVE LANGELIER.

POULTRY.

The poultry department at this Station is only being organized, and as yet no buildings have been erected and very little stock procured. In ordinary poultry only one breed will be kept, Barred Plymouth Rocks, of which it is hoped to raise about one hundred from this spring's hatching.

This breed of fowl has been selected because it is the most common in this section and it has been thought that more good will be done by confining our efforts to the one variety rather than dividing our attention among several.

Turkeys, geese, and ducks will be kept; at present a start has been made with the turkeys, and a trio of the Bronze variety has been secured.

The incubators are being run in an old poultry house and the chicks brooded in three colony houses, but it is hoped that this summer will see a beginning made towards an up-to-date poultry plant.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF SUPERINTENDENT, W. C. McKILLICAN. B.S.A.

POULTRY.

In August, 1913, a start towards the establishment of poultry work on this Farm was made. Four cotton-front houses 10 by 12 feet were built and placed in a new location on the east side of the Farm. Two of these are double boarded round the sides, and two are single-boarded with building paper on the inside. All four have a single-boarded floor and roof consisting of sheeting, building paper, and shingles. Ten hens and fifteen pullets of the farm stock of Barred Rocks were placed in one of these. On November 18 a further twelve hens and thirteen pullets of the same breed were purchased and placed in another of these houses. The remaining two houses were filled with twenty-five White Wyandotte pullets. These houses are fitted with trap nests, and a record is being kept of each hen's laying.

During the winter these hens were not forced for egg production as winter eggs were not as important this year as strong fertility and healthy chicks. On February 1, three cockerels were placed with the twenty-five White Wyandotte hens in house No. 1, three cockerels with twenty-five White Wyandotte pullets in house No. 2, two cockerels and one cock with the ten Barred Rock hens and fourteen pullets in house No. 3, two cockerels with twelve Barred Rock hens and eleven pullets in house No. 4. Commencing the latter part of February, the hens received more and richer food, and a proportion of meat meal was added to the dry mash. This, and the better weather, made the eggs rise from a total of 123 for February to a total of 966 for March.

The cotton-front houses seem satisfactory. Although the temperature dropped as low as 46° below zero, the hens did not seem to suffer very severely. All the grain was scattered in a deep litter and the hens made to work for every kernel.

Two new incubators were purchased in the spring of 1914. Two more cotton-front houses were built in March to be ready to accommodate the chicks when hatched. Adaptable hovers will be used in these houses to brood the small chicks.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF SUPERINTENDENT, T. J. HARRISON, B.S.A.

POULTRY.

Considerable work with poultry had been done in the early years of this Farm. Of late years, however, practically no investigation work was carried on. Two breeds were kept, Barred Rocks and White Wyandottes. These were used for producing eggs and fowl to supply the Farm. They were housed in a permanent building partly underground, and in winter were kept warm by means of artificial heat. This building was not proving very satisfactory since, being underground, it was hard to keep dry, and no means of ventilation was provided.

In September, 1913, three colony houses were built. Two were 12 by 14 feet with a floor, suitable for forty birds each, one was 10 by 12 feet with a floor, for twenty-five birds. When these were completed, 40 White Wyandotte and forty Plymouth Rock hens were received from Quebec. These were placed in the two large houses, while the small house was filled with a mixed flock from the Farm. During the winter the temperature at this Station went as low as 44° below zero, but the birds all came through without even a frozen comb. They always seemed to be both vigorous and contented. The early winter egg production was small, but this can be partly accounted for by the fact that the birds were shipped from Quebec in November. From observations so far it can be concluded that hens can be wintered in the cotton-front house in southern Saskatchewan without danger of the birds freezing. Whether this is a more satisfactory house than the artificially heated one for winter egg production cannot be stated from investigations so far, but this test will be continued and something more definite will be available after another season's experience.

While the three houses were similar, there was some difference in construction. One of the large houses had no glass whatever, the light being all taken from the cotton windows. The other large house had a small amount of glass, while the smaller house had both glass and a floor. It would seem that the hens were more comfortable in the house without the glass, while those in the floored house suffered, if anything, more from the cold.

These houses are built with an idea of producing a building that will be suitable for the average farmer on the prairie. Here only a small flock of fowl is kept and a house large enough for from twenty-five to forty birds will be found most suitable. The houses are cheap in construction. Plans and specifications may be secured from the Central Experimental Farm, Ottawa, or from the Experimental Farm, Indian Head, Sask.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF SUPERINTENDENT, G. H. HUTTON, B.S.A.

POULTRY.

During the year the poultry plant has been permanently located in a 15-acre field, to the southwest of the main barns. Included in this location is a small lake of 3 or 4 acres, around which are a number of trees and shrubs that make an ideal place for the growing of young stock.

SOME NEW BUILDINGS.

A brooder house has been erected and a Simplex Brooder installed. Twelve "A" brooder houses have been built to raise the chicks on free range.

Outside fencing has been erected, and temporary divisions made providing for twelve breeding yards at the present time. It is, however, not the intention to have yards outside of the breeding season, as colony houses will be used to give the stock accommodation on free range for most of the summer at least.

Several new buildings have been built on this location this year. The new buildings consist of: An administration building 18 by 24 feet, with a cellar for incubators, a ground floor, including an office for the poultryman, a feed room, and an attic for feed and stores generally; a frame poultry house 18 by 24 feet, to accommodate from 100 to 125 birds. This building is double boarded and papered outside and double papered and shiplapped inside, while over the joists woven wire fencing is stretched and the loft filled with straw. Fronting the south one-third is lumber, one-third glass and one-third cotton, divided so that the light and air are equally distributed throughout the house. Another house is made of logs, and is an adaptation of an old dwelling house and is an illustration of what a poultryman might do with poles for building material or with many an old building not put to other use.

THE STRAW HOUSE.

The eight colony houses and the frame house that were previously on the plant are utilized as breeding pens, and the straw house that was used last season was taken down and rebuilt on the new site. This straw house should prove satisfactory where it is necessary to keep the original cost as low as possible. The building is 10 by 40 feet with accommodation for eighty to one hundred birds. The walls are built of baled straw. The roof is of boards and shingles, built in sections so that should the straw require renewal, the roof can be removed readily.

So many inquiries have been received regarding the construction of this house that a circular letter has been prepared giving details, the following being a copy:—

> "The ordinary hay baler is used for baling the straw for the poultry house, putting three wires around each bale. The work was done by hired labour at a total cost of $2.50 per ton. Baling with a good machine will run from 12 tons to 15 tons per day, with an average of 15 tons per day when things are working well.

"The straw house is cheap and sanitary. If the house is kept sprayed, as any house should be, there will not be any trouble from vermin, and up to the present gophers have not interfered. The roof rests on a plate nailed to the top bales with spikes, which is quite sufficient. The most satisfactory roof is the board and shingle roof. The spaces at the ends of the building near the roof are stuffed with parts of bales. Rough sticks or boards laid on the ground under the bales will increase the life of the house.

"The bales are laid like bricks and are not tied in any way, but if considered advisable, wire might be run the length of the house and over willow or other posts at each end and twisted up.

"The perches, with nest boxes underneath, are movable.

"Cotton is used in place of windows, and so far has proven fairly satisfactory."

STOCK AND BREEDING.

The breeding stock in the spring of 1913 consisted of Barred Plymouth Rocks, White Wyandottes, Buff Orpingtons, and Rhode Island Reds, a total of seventy-two breeding hens; six Bronze turkey hens and one gobbler, and two Toulouse geese and one gander.

Fifty Pekin duck eggs were purchased, hatched in the incubator, and thirty-two of these proved fertile; from this number twelve ducks were brought to maturity. About ninety-eight turkey eggs were set under hens, ten of which proved infertile. From the eighty-eight fertile eggs, eighty-seven were hatched and were reared up to several weeks old. Coyotes secured thirteen birds, and losses from other causes amounted to twenty-two, leaving a balance of fifty-six for sale and breeding purposes. The heavier birds weighed from 16 to 18 pounds for males, and 8 to 12 for hens at the end of November. Throughout the growing season the young poults were very thrifty, and this climate appears quite favourable for the growing of turkeys.

The 1913 crop of chickens amounted to 488 birds, the cull cockerels and pullets were crate-fattened on a ration of skim-milk and ground oats from which the hulls were sifted. These birds when fleshed were worth from 12½ cents to 22½ cents per pound wholesale f.o.b. Calgary or Edmonton, bled and rough-plucked. The local retail price per pound was from 20 cents to 25 cents for well-fattened birds dressed ready for the oven.

The breeding stock mated for 1914 season consists of 170 Barred Plymouth Rocks, 20 Wyandottes, 52 Rhode Island Reds, 24 Buff Orpingtons, 10 turkeys, 5 geese and 8 ducks.

The following prices have been agreed upon for breeding stock, eggs, and chicks, when such are for sale:—

Bronze Turkeys.—Young gobblers, 18 pounds and over, $6 each. Hen turkeys (young) to $5 each, running in size from 10 to 15 pounds. Turkey eggs, 25 cents each.

Pekin Ducks.—Young drakes, $4 each. Duck eggs, 15 cents each.

Barred Rocks, White Wyandottes, S. C. Rhode Island Reds, Buff Orpingtons.—Cockerels, $2 to $4 each. No pullets for sale this year without inspection: after inspection, $1.50 to $2.50 each. Eggs from $2 to $3 per fifteen.

Custom Hatching.—Day old chicks $10 for fifty. For hatching 100 eggs, $5, carriage paid both ways by customer. Infertile eggs, if marked by customer before sending consignment to be hatched, will be returned with the chicks if desired.

The custom hatching is decidedly experimental, but as this will be an important branch of poultry keeping, the work will be investigated so as to be able to furnish definite information on this important phase of poultry work.

LACOMBE.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF SUPERINTENDENT, P. H .MOORE, B.S.A

POULTRY.

As reported last year, the poultry work at this Farm was just reorganized, and a capable man, in the person of Mr. V. Kuhn, was given charge of the details of the work. Considerable progress has been made during the year and there is now a good foundation for future work.

All the yards and paddocks have been put in good form, and three colony houses for chick rearing have been built. In these, coupled with a few small, old ones, the chicks for this year's work were raised. At the close of this year, four lighter and more improved but cheaper colony houses were built for the coming season's work.

From this year's hatching, after culling very closely, there were 235 White Leghorn pullets and 24 Barred Plymouth Rock pullets to put into the pens. All chickens were raised on a clover range and were hopper-fed during the season. One pen of twenty-four Barred Plymouth Rock was purchased locally. These were well grown, useful birds, but not show birds. Another pen of eighteen Barred Plymouth Rocks also purchased locally were not so well grown as either the Farm stock or the first pen purchased, but they were a much better type than the other pens. Twenty-nine yearling hens were selected from the White Leghorns on hand, and twelve cockerels were kept for breeding.

This made the flock of laying and breeding stock 342 birds. Besides these there were a pen or two of Rhode Island Reds and off-type specimens of other breeds, which were forced for eggs and sold as meat in the early spring. These being well matured, just paid for their food with eggs, but they gained weight and brought a higher price per pound than they would have if they had been sold in the autumn. This number filled every available house on the plant.

The experiments conducted were mostly of a general character, and any report made will be one of progress rather than of results. A few other experiments were started, but they are not far enough advanced to warrant any comment as yet. Until another year we shall not have our stock uniform enough to allow many comparative tests, and those reported this year should be read with this point in mind.

With the exception of two pens, the layers were fed a dry mash from hoppers, and wheat, or wheat two-thirds and cracked corn one-third, in the litter. The corn was mixed with the wheat in the late fall and fed during the cold or damp, cool weather in winter. The dry mash consisted of the following:—

	Lbs.
Wheat bran	100
Wheat shorts	50
Feed flour	50
Fine cracked corn	200
Ground oats	200
Soy bean cake	50
Beef scrap	50

A small amount of skim-milk was fed during the winter, but the quantity available was not great. Mangels were fed during the winter for green food. In the spring the pullets had to be used for breeders, for only twenty-nine old hens were kept. The results of the hatching work will be seen in the following tables.

The eggs from the different pens were, as much as possible, put in equal numbers in the different incubators, so as to have all conditions as equal as possible.

TABLE No. 1.—Showing cost and amount of feed fed, cost of producing one dozen eggs and fertility and hatchability of eggs set with 29 White Leghorn hens and 237 pullets.

WHITE LEGHORNS.

—	Two-year old hens.	Pullets.	Average of both.
Number of birds	29	237	133
Number of days	151	142	146·5
Amount of grain fed Lb.	871	5,376	3,123·5
Amount of mash fed "	104	1,042	573·
Amount of skim-milk fed "	698	3,254	1,976·
Total number of eggs produced	821	9,901	5.361·
Weight of eggs produced Oz.	1,862·25	18,793·9	10,328·075
Weight per dozen eggs "	27·2	23·15	25·175
No. days per hen per dozen eggs	64	40·2	52·1
Pounds grain consumed per dozen eggs Lb.	14·2	7·56	10·88
Pounds of skim-milk consumed per dozen eggs "	10·2	3·8	7·
Cost to produce 1 dozen eggs	25·27c	12·46c	18·865c
Per cent eggs fertile	85·28	87·54	86·41
Per cent fertile eggs hatched	50·	60·3	55·15
Per cent total eggs hatched	41·2	52·725	46·862

NOTES.—The laying period was: In the hens, November 1 to March 31; in the pullets, November 9 to March 31.

It will be noticed that the pullets produced a dozen eggs at half the cost for feed that the hens required.

TABLE No. 2.—Showing the relative value of three pens of Barred Plymouth Rocks.

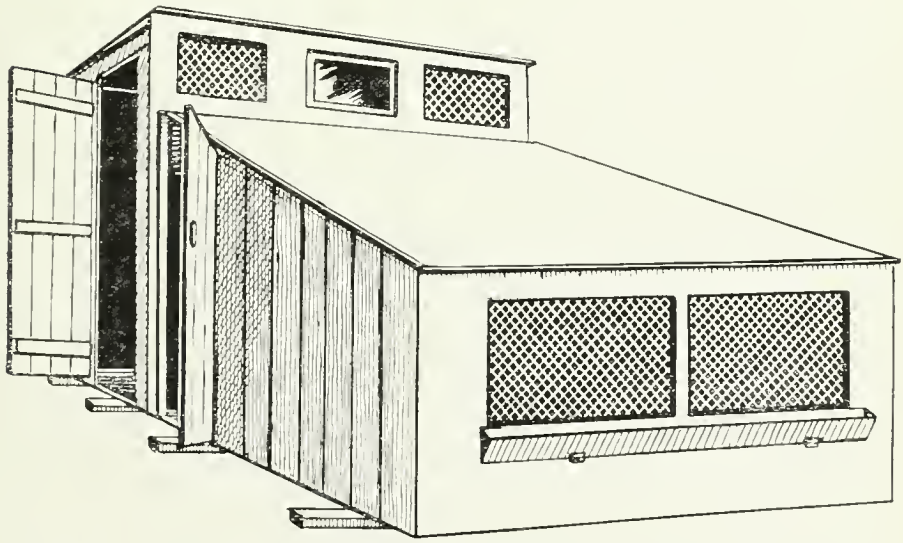
	No. 1 Home-bred raised on range.	No. 2 Purchased locally.	No. 3 Purchased locally.	Average per pen.
Number of birds	24	18	24	22
Number of days	151	151	151	151
Amount of grain fed lb.	700	675	809	728
Amount of mash fed lb.	43	34	98	58·3
Amount of skim-milk fed lb.	470	407	507	461·3
Total number of eggs produced	1,251	797	1,148	1,065·3
Weight of eggs produced oz.	2590·5	1595·5	2231·5	2139·1
Weight of eggs per dozen oz.	24·84	24·	23·28	24·04
Number of days per hen per dozen eggs	34·7	40·9	37·8	37·8
Pounds of grain consumed per dozen eggs	7·1	10.6	9·4	9.03
Pounds of skim-milk consumed per dozen eggs	4·4	6·1	5·3	5·26
Cost to produce one dozen eggs	12·4c	18·46c	16·34c	15 73
Per cent of eggs fertile	88·	.....	83·76	85·88
Per cent of fertile eggs hatched	51·1	.....	48·7	49·9
Per cent of total eggs hatched	45·03	.....	40·22	42·62

NOTES.—The period for all pens was November 1 to March 31.

The birds in pen No. 1 were bred and reared on the Farm. Pen No. 2 had no special breeding. Pen No. 3 were not so well matured as pen No. 2, but of a better type.

AGASSIZ.

Room Brooder. Poultry Division, C. E. F.



The Utility Poultry House.

Made in two sections so that one horse can move it by taking one half at a time. It also can be divided into two houses for brooding purposes.

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TABLE No. 3.—Showing the relative value of feeding hens a dry or wet mash.
WHITE LEGHORN PULLETS.

—	Pullets on dry mash.	Pullets on wet mash.
Number of birds	25	14
Number of days	121	121
Amount of grain fed . . . . . Lb.	610	207
Amount of mash fed . . . . . "	99	101
Amount of skim milk fed . . . . . "	502	135
Total number of eggs produced	1,318	549
Weight of eggs produced . . . . . Oz.	2,514·5	1,182·5
Weight per doz. eggs . . . . . "	22·8	25·8
Number days per hen per doz. eggs	27·3	37·
Pounds grain consumed per doz. eggs	6·4	6·7
Pounds skim-milk consumed per doz. eggs	4·5	2·9
Cost to produce 1 doz. eggs	11·36c	11·42c
Per cent eggs fertile	90·74	93·99
Per cent eggs (fertile) hatched	55·74	59·2
Per cent total eggs hatched	49·66	56·3

NOTES.—Both dry and wet mash were of the same composition and identical with the ration given above.

The pullets on the dry mash were allowed to eat from a hopper *ad. lib.*, while the wet mash was fed once a day and as much as the birds would eat up clean.

The dry mash in this instance produced more eggs per bird, but the cost per dozen was practically the same.

INCUBATORS.

All the incubators were run in a small cellar. This cellar kept a reasonably constant temperature throughout the season. The average highest temperature of the cellar in the morning for any machine's period was 62·4°F., and the afternoon was 63·7°F. The temperatures were kept from the 15th March to the end of May; the highest temperature recorded was 70·6°F., and the lowest was 54·6°F., but this range was spread over a period of over seventy days while the temperature outside was gradually going higher. The following chart will give an idea of the average temperature of the room and machines during the hatching season, also the very highest and lowest temperatures that the machines or room attained during all the settings.

The highest temperature recorded may not have occurred in the same hatch as the lowest, but it is the extreme range of the season.

TABLE No. 4.—Average and highest and lowest temperatures of room and machines.

Name of Incubator.	TEMPERATURES.											
	Machine.		Room.		Machine.				Room.			
					Highest.		Lowest.		Highest.		Lowest.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
	°	°	°	°	°	°	°	°	°	°	°	°
Tamlin	103·5	104·5	61·9	62·9	105·5	106·6	101·	103·	68·6	70·	56·6	56·6
Cyphers No. 3	103·4	104·1	61·4	62·4	105	106·	101·3	100·6	67·66	70·6	56·	56·
Jubilee	103·	103·3	62·4	63·7	105·6	105·5	100·	101·1	68·3	70·6	56·6	57·6
Prairie State	104·8	103·3	62·2	62·5	105·	104·6	100·	100·3	67·6	70·6	54·6	55·

AGASSIZ.

TABLE No. 5.—Giving a few particulars as to the size of machine used, together with the cost, the amount of oil used and average cost per chick hatched.

—	Prairie State.	Jubilee.	Tamlin Non-pareil.	Cyphers.
Capacity of machine.....Eggs.	130	100	100	350
Cost of machine.....$	30	25	35	52
Average quarts oil for 21 days.....qts.	11.5	12 125	8 5	17 43
Average cost per 21 days, oil 30 cents per gal.....cts	86 25	90	63 75	130 00
Average oil cost per chick hatched.....cts.	2 2	1 8	1 1	7
Average cost per chick, calculating 10 per cent cost of machine.....cts.	1 8	1 2	1 5	9
Average total cost per chick.....cts.	4	3	2 6	1 64

NOTE.—It will be noticed that the large machine hatched with less expense per chick than did the small machines.

AGASSIZ.

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF SUPERINTENDENT G. H. PARHAM.

POULTRY.

In September two cotton-front poultry houses, 14 feet by 16 feet, were built, and also a third house of a different style, called the utility poultry house. This latter style of house should prove of economical value in this country as it is so arranged that the part used as a winter scratching shed can be removed in the summer and used as a house for young chickens, *i. e.*, at a time of the year when houses are greatly in demand. The plan of this house is subjoined.

Twenty-five White Leghorn pullets and the same number of Barred Rock pullets from good laying strains were purchased in August and placed in the two cotton-front houses. The White Leghorns commenced to lay at the end of October, and the Barred Rocks early in November. Their egg record for the six months was as follows:—

—	Oct.	Nov.	Dec.	Jan.	Feb.	March.
White Leghorns.....eggs	2	140	177	228	203	460
Number of birds	25	25	24	24	24	23
Barred Rocks.....eggs	0	84	170	220	124	389
Number of birds	24	22	20	20	20	20

The birds were fed three times a day on a diet consisting of: First feed, wheat scattered in the litter; second feed, soft food consisting of boiled cabbage mixed with shorts and rolled oats; third feed, wheat in the litter. Each pen had half a beef head chopped up per week. Grit and oyster shell *ad lib.*

This record, though by no means phenomenal, was so much better than usually experienced throughout the winter months in this locality that it has created considerable interest among poultry keepers. It also shows that this open-front style of house is quite suitable for this climate.

The first hatch of 140 eggs was placed in an incubator on March 8.

A Bronze gobbler and three hens were purchased in February and have since been confined in a group of fir trees surrounded by a wire fence. They commenced to lay early in March.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT

FROM

THE TOBACCO DIVISION

For the Year Ending March 31, 1914

PREPARED BY

The Dominion Tobacco Husbandman. - - - - - - - - - - - - F. Charlan.
Manager, Tobacco Station, St. Jacques, Que. - - - - - - - - - O. Chevalier, I.N.A.
Manager, Tobacco Station, Farnham, Que. - - - - - - - - - - O. Chevalier, I.N.A.
Manager, Tobacco Station, Harrow, Ont. - - - - - - - - - - - W. A. Barnet, B.S.A

REPORT FROM THE TOBACCO DIVISION.

OTTAWA, March 31, 1914.

The Director,
Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to transmit herewith the report of the work carried on by the Tobacco Division for the fiscal year ending March 31, 1914.

In addition to my own report as Chief of the Division, which deals more especially with the work at Ottawa, there will be found herein reports from Mr. O. Chevalier, in charge of the Tobacco Stations at St. Jacques l'Achigan and Farnham, Que., and from Mr. W. A. Barnet, in charge of the Tobacco Station at Harrow, Ont.

The work of the Tobacco Division, in addition to the spreading of information, which is carried on principally by correspondence from headquarters at Ottawa, consists in the study of those varieties of tobacco now grown in Canada or considered worthy of trial here, along the lines of their suitability to our climatic conditions and to the needs of the Canadian manufacturer.

This general programme involves the study of all the phases of tobacco culture from the sowing of the seed to the delivery of the product to commerce. One has, therefore, to face in turn all the problems relative to the preparation of the soil, the making of the seed-beds, and preparation of the mould, the setting out and care of plants, the various modes of harvesting and curing and lastly the phase, properly speaking an industrial one, of fermentation and preparation for market.

The experiments carried on under each of the heads named above render the work most valuable to the tobacco grower. For example, the seed is sown in beds prepared after different methods; in the plantations, the characters peculiar to each variety, such as development, form, earliness, best height of topping, disease-resisting power, yield, etc., are studied; the most promising plants are selected with a view to the production of choice seed. Chemical fertilizers are used with a view to ascertaining the best formula to use and the best quantity to apply, combined with barnyard manure, to secure the largest net return. Again, the study of practical means to shorten the period of curing and to lessen the cost of cultivation is a most interesting question in a country like Canada where labour, at certain times of the year, is scarce and high and where, especially in the province of Quebec, severe early frosts occur.

As a whole, the season of 1913, like that of 1912, was not favourable for tobacco growing in Canada.

The cold weather prevailing during the greater part of June and the prolonged drought following, retarded growth considerably and lessened the weight of crop noticeably. In Quebec, the losses were especially felt in the northerly counties of L'Assomption, Joliette, Montcalm, etc. The counties about St. Cesaire were less affected by the drought, but suffered from the cold weather of June. In addition, a comparatively early frost (September 15) touched some plantations and destroyed the plants reserved for seed at the Farnham Station.

In Ontario, the same weather conditions prevailed, retarding growth and harvest. Still worse, a hailstorm on August 3 struck one of the most important tobacco-growing districts (Colchester) at a moment when many plantations were already topped. The damage was so great that in many cases the crop was practically destroyed.

The situation in this district was made more grave by the appearance at numerous points of a disease the cause of which had hitherto been little known or studied, namely *Thielavia basicola* or Tobacco Root Rot.

For some time it had been observed that some land, after having been planted to White Burley for a period of years, refused longer to produce a normal crop of this variety, no matter what care was taken in preparation of the soil. Moreover, this state of affairs seemed to become worse from year to year.

Certain varieties like the Seed Leafs seemed to do well on these lands, where the Burley would no longer grow, and hence such soil was termed "Burley sick." The phenomenon was explained as being the action of soil toxins on the roots of the plant which had secreted them, but which were without effect on the roots of other varieties of the same botanical group.

In reality, whatever the effect of these toxins may be, they did not enter into this question. The true cause was a larval form of Tobacco Root Rot, *Thielavia Basicola*, a disease well enough known, but whose common form consisted of an almost complete decomposition of the fibrous roots and even of the main root up to the level of the crown. In the form observed in Ontario, however, the only trace of the disease consisted of brown spots, hardly visible to the naked eye, at the ends of the fibrous roots. In most cases, apart from the feeble appearance of the plants attacked, no trace of the disease could be observed, the affected portion of the roots remaining in the soil unless the plant was lifted with the greatest care.

Expert opinion traces this disease to the nature of the materials employed in making the seed-beds. One frequently notices, on bush land, that the disease has attacked the wood violets and cyclamens, and it is soil of this very character that is used, on account of its dark colour and great fertility, for the upper portion of the seed-beds, wherein are placed the seeds. On germination, the roots are rapidly infected, causing what is commonly known as root rot.

However, although the study of this disease on the plantation had been incomplete, it has been carefully observed in its action on the seedling. Among some planters, the seed has been subjected to treatments aimed at freeing it from the germs of *Thielavia basicola*. But the process of disinfection (generally treatment of the mould by steam) was applied too late, since the fields themselves had become infected.

Plant pathologists who had interested themselves in this question claimed that the use of artificial fertilizers with an acid reaction (as the superphosphates) would allow of the establishment of soil conditions unfavourable to the development of the germs of *Thielavia basicola*. A set of experiments to test this was laid out, in collaboration with Walker & Sons, in the autumn of 1913. Unfortunately, certain reproductive forms of *Thielavia* are very resistant and can remain in the dormant state for five years, until favourable conditions for development again appear. One can easily understand that, under these conditions, the struggle would be a severe one, and its success, owing to possible oversight, far from assured.

At any rate, the importance of treating the mould by steam or formalin has been brought to the attention of the tobacco-planters of Ontario and suitable methods have been indicated.

The efficacy of the steam treatment has been placed beyond question; it remains to show the value of the use of formalin for this purpose, it being more convenient for most growers to use.

The formalin treatment has been used for four years at the Central Experimental Farm, after it had been compared with steam for the same purpose. Formalin gives very good results with greater economy and, with the exception of the first year, when the mould was not treated, we have never noticed any disease in the seed-beds. It should be added, however, that few planters care for their mould as well as is done here with that delivered to us by the Division of Horticulture.

The reports of Mr. O. Chevalier, for Quebec, and of Mr. W. A. Barnet, for Ontario, give in greater detail the results of the work at the Stations under their charge. It

will be merely remarked here, in passing, that considerable improvements were made on the Farnham Station during the year. The chief were the putting up of fencing, the drainage of a considerable area and the clearing of the central part of the Station.

The harvesting of the crop and its placing in the curing shed was made the subject of an experiment which will probably be concluded in the autumn of 1914.

The comparatively early frost of September 15 destroyed what promised to be an abundant harvest of choice seed at Farnham, especially of the hybrids Yamaska and Big Ohio X Sumatra, which had been re-selected.

The harvest at St. Jacques l'Achigan, although saved before the frost, was insufficiently developed and somewhat too thick in texture for use as wrappers. The plantations of this Station suffered more from drought from the fact that the by-laws of the municipality of Maisonneuve prevented us from getting, at the time desired, the manure from the abattoir, which we generally use each spring.

I have the honour to be, sir,

Your obedient servant,

F. CHARLAN,
Dominion Tobacco Husbandman.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

REPORT OF THE DOMINION TOBACCO HUSBANDMAN, F. CHARLAN.

The area available for experimental work with tobacco at the Central Farm does not permit of the growing of more than one acre of tobacco each year.

It is impossible to produce, on such a small piece of land, a fair-sized crop of any one variety, and therefore the land has been devoted, of late years, to the study of new varieties before sending them out for trial on the Tobacco Stations, and to the production of seed.

It may be said here that, owing to the special attention we have been able to give this latter portion of our work at Ottawa, the best seed has always been obtained here, and it is from this source that the seed of the best quality, which is distributed throughout the province of Quebec, is obtained.

The varieties grown at Ottawa in 1913 were as follows:—Brazil las Almas, Brazil St. Felix, Connecticut Broad Leaf, Connecticut Seed Leaf, Big Ohio, Comstock Spanish, General Grant, Big Havana, Erbasanta Long Leaf, Erbasanta Short Leaf, Chwizent, Canelle, Erzegovine Giant, Erzegovine Stolak, Virginia X Erzegovine Giant, and Virginia X Erzegovine Giant X Virginia.

Of these, the Brazils, Connecticuts, Big Ohio, Comstock, General Grant, Big Havana, and Canelle were grown especially for seed production. The Erbasantas were grown in order to get their weight of yield and percentage of nicotine; the Chwizent to judge of the possibility of employing it in crossing with the Virginias, for the production of yellow tobaccos; the Erzegovines and their hybrids to see whether these were suitable for Canada, and whether they, too, could be used in the production of yellow tobaccos (of the flue-cured type).

Seed-Beds.

These comprised two semi-hotbeds, built up on a foundation of tobacco stems and one hotbed on a foundation of fermenting horse manure. The mould was disinfected with formalin after being put into place in the beds, commencing the 12th of April. After the formalin evaporated, the cold beds received an application of chemical fertilizer 3-8-3, at the rate of 1 ounce per square foot of bed. No fertilizer was applied to the hotbed.

Seed was sown on April 24 in the hotbed, the seeds being put in dry; swollen seed was used in the cold beds, sowing taking place on April 26.

No trace of disease was noted.

Growth in the hotbed was slightly more rapid at first but it was quickly overtaken by the cold beds as soon as the roots in the latter had developed sufficiently to come into contact with that part of the soil containing the chemical fertilizer (about one-half inch below the surface).

The temperature kept up during the coldest period, from the 2nd to the 18th of May, showed that by observing the simplest precautions, equally necessary for the hotbed as for the semi-hotbed, it is easy to maintain in the latter a temperature quite as high as in the hotbed. The difference between the minimum temperature in the two was rarely more than 1° C. in favour of the hotbed, and frequently no appreciable difference could be observed.

The temperature were taken every day, at 7 a.m. and 2 p.m.

Without wishing to be too dogmatic, until the results of another season's observations have been obtained, the conclusion may be drawn that the hotbed does not give better results than the more economical semi-hotbed. Moreover, the presence of manure in fermentation under a comparatively thin layer (5 to 6 inches) of mould must favour the growth of fungi and the germs of disease.

In short, growth during the latter part of May should be slow, and the plants grown in the semi-hotbeds appeared to be as well formed as those in the hotbeds, and more hardy.

Setting Out.

This was performed from May 31 to June 3. All the plants were set out by hand, without watering afterwards.

The transplanting was helped by showers, but the cold weather which followed from June 1 to 10, along with the violent winds which spoiled the application of poisoned bran for the cutworm, made growth slow until the middle of June. There were, indeed, some frosts, which, however, only roughened slightly the outer leaves of Chwizent.

Distances.	Varieties.	Date of Harvesting.	Total Yield.
Feet.			Lb.
3 by 2½	Big Ohio	September 9.	1,857
3 by 2	Erzègovine Giant	August 27.	939
	Virginia Bright x Erzègovine Giant	" 27.	1,225
	Virginia x Erz. x Virg.	" 27.	1,441
	Erzègovine Stolak	" 27.	1,288
	Connecticut Seed Leaf	September 6	1,784
	Connecticut Broad Leaf	" 6	1,590
	Big Havana	" 8	1,703
	General Grant	" 8	1,496
2½ by 1½	Brazil St. Felix	August 25.	1,228
	Brazil las Almas	" 25.	1,366
	Chwizent	" 15 to 25.	1,393
	Erbasanta Long Leaf	September 11.	2,389
	Erbasanta Short Leaf	" 11.	2,654
	Comstock Spanish	" 5	1,334
2 by 1	Canelle	August 14.	1,273

The above table indicates the distances apart at which the different varieties were planted, the date of harvesting and the yield of raw tobacco (containing from 25 to 28 per cent moisture) calculated from the number of plants not reserved for seed production.

The drought, the effects of which were so apparent on the tobacco plantations of Quebec and western Ontario, also affected those at Ottawa. It was only by repeated cultivations that the effects of the dry weather were minimized and a crop, estimated at about two-thirds of the normal, obtained.

As usual, of the varieties tested in 1913, the Canelle was the earliest. It was harvested at the normal time, but it should be noted that, as in the case of all the other varieties grown, this harvest refers only to plants too feeble to be reserved for seed plants. These are always earlier in ripening.

Among the seed plants, the Canelle was harvested partly before the frosts of the 13th, 14th and 15th of September, and partly after the 19th. The seed gathered from the later harvested plants was not distributed.

On September 20, all the seed plants remaining on the plantation, that is to say, almost all the varieties grown with the exception of Canelle, were pulled up with as much soil as possible adhering to the roots, and were piled in a tent which was set up each night and taken down in the morning. Sheltered from frost in this way, the seed pods matured without accident.

The few seed plants of Erzegovine Giant which had been preserved were transplanted into pots and placed in a well-lighted part of the tobacco warehouse where they finally bloomed but produced few pods and only a small amount of seed.

NOTES ON THE VARIETIES TESTED.

Connecticuts, Big Ohio, Big Havana, General Grant.—Among the requests for tobacco seed received each year from growers in the province of Quebec, those for the Connecticuts, General Grant, and Big Havana have increased noticeably during the last two years. These requests come specially from the counties of Montcalm, Joliette, l'Assomption, and Berthier, and it would appear that after devoting several years to growing Comstock Spanish, which had taken the place of the large and heavy-yielding pipe tobaccos, the growers of this region have returned to the latter.

It is difficult to understand the economic reasons which have caused this return to the growing of varieties comparatively slow in maturing and which rarely escape damage from the early autumn frosts, without mention of the fact that their enormous development of leaf ribs makes their curing sometimes difficult. It would seem that the low price paid during the last two or three years, unfavourable ones for the northern-grown Comstocks, have discouraged these growers.

There are grounds for hope of an increase in price with a normal crop, while the over-production of the large varieties can only result in lower prices being received.

In any case, even at Ottawa where the growing season is much longer than in the counties mentioned above, the growing of the large Connecticuts is hazardous enough. The General Grant can be recommended for the Ottawa valley. It is harvested late, it is true, but on account of the advanced stage of maturity at which the harvesting takes place it is less exposed to frost than the varieties with tender leaves, full of water, like the Connecticuts, which are harvested when much less mature and which, in reality, are much later.

Of all the varieties tested here, the Big Ohio is much the latest in maturing. It may be noted that it is cut at a very early stage of maturity.

The Big Havana is very little earlier, and could not be recommended for those parts of the province of Quebec where frost is to be feared before September 15.

OTTAWA.

The yields in weight of all these varieties are, as may be readily proved, very attractive and more so because in a normal year the return may be superior, but their culture is very risky, since at least one harvest out of two is exposed to frost.

It may be added that in former years the Big Ohio variety was tried at St. Jacques l'Achigan. The ribs of this variety were so strong that in curing the leaves we were obliged to keep fires going in the curing shed for nearly three weeks.

Comstock Spanish.—This tobacco, in spite of the unfavourable season of 1913, gave an almost average crop. One cannot recommend it too highly for the province of Quebec, on account of its earliness and the various uses to which it may be put.

Brazils.—The yield was satisfactory, but the texture left something to be desired. This variety is difficult to get established in the plantation. It does not do well except in very favourable years when the plant finds itself, from the beginning, in surroundings to its liking and when it is not subjected to too sudden variations later on. It is hoped to use the crop of this variety as "filler" (tobacco for the inside of cigars). The Brazil gave a crop superior in weight to that of the Cuban, but it is much less hardy than the latter.

Chwizent.—The seed of this was renewed, or rather we obtained our first supply of Canadian seed of this variety of *Nicotiana rustica*. This stock will be used in the course of hybridizing work which will be undertaken in connection with the study of the Canadian yellow tobaccos.

Erzegovine Giant.—As may be judged from the plate, the stalk of this variety carries more than forty leaves. These, set very close to each other, are of medium size, (14-inch—16-inch) rounded in form, and although the opening of the flower occurs very late, the leaves on the lower half of the plant ripen sufficiently early and with little interval between them.

By judicious topping (a reduction of the number of leaves to twelve, fourteen or sixteen) this characteristic permitted of the harvesting of the crop which, on August 27, showed the characteristic colour of the yellow tobaccos.

The yield in weight is relatively small. It should be stated, however, that we have been able to increase the number of leaves retained without delaying maturity too much. After curing, the leaves of the Erzegovine had a dry texture, a little too much like paper. The loss of water in the curing process is considerable and the weight of cured tobacco obtained is much less than one would expect from the appearance of the plant while growing.

Virginia Bright x Erzegovine—Virginia Bright x Erzegovine x Virginia Bright.—These hybrids, little fixed in type, act nearly like the Erzegovine Giant, from which they obtain their early ripening habit. The form of leaf differs naturally, according as the Virginia characteristic is more or less dominant. The weight of crop varies in inverse ratio to earliness; the more apparent the Virginia characteristics, the greater the toughness of the tissue, and the lower the yield.

Erzegovine Stolak.—This also appears to us to be a hybrid. On account of the variations of form in the 1913 crop of this variety, it was difficult to form an exact idea of its true type. An individual selection has been commenced which, if it does not clear up the question, will at least furnish some interesting types. The seed of the four last-named varieties was furnished us by the Royal Italian Institute of Scafati. These varieties have been established in Italy, where they are used in the production of yellow tobaccos. Their suitability to the climate of Ottawa district has been such as to lead to their more extended trial, in 1914, on the Harrow Tobacco Station.

Most of these tobaccos were subjected to individual selection in 1913. Previous to this year, owing to the limited space at our disposal and the small staff engaged, it was impossible to give sufficient attention to the work of breeding, hybridization, and selection, but it is hoped that a good foundation has now been laid for future work along these lines.

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Erbasontas.—These also were two Italian tobaccos, the seed of which was sent us from Scafati. They gave yields so remarkably high that report on them is reserved until after further trial. If the yields continue high, as hoped, it will prove the possibility of establishing on a profitable basis, the industry of the preparation of nicotine.

FERMENTING WAREHOUSE.

The packing of the 1912 crop was finished by the end of May, 1913. Part of the tobacco on coming from the bulk was brushed by hand to remove certain traces of mold which they showed. This operation was completed more rapidly than had been expected. Another lot was treated with low pressure steam (5 pounds). It was ascertained that, to obtain good results, the tobacco must be subjected to the action of the steam for about five minutes. At the above pressure, although the steam is very moist, the leaves are not stained if the precaution is taken to keep them protected from any jets of water or direct contact with the steam.

The tobacco harvest from St. Jacques l'Achigan was received at Ottawa the end of December, and that from Farnham the end of January. The latter had been sorted at the Farnham Station.

After many trials, a sorting table was chosen consisting of a surface graduated by parallel lines 2 by 2 inches apart. The divisions are marked in odd numbers; for instance, all the tobacco contained between the divisions 17 and 19 are of an average length of 18 inches.

The formation of the bulks was undertaken during the first days of March. Fermentation was established normally, rapidly reaching a temperature of 50° C.

Proportion of tobacco suitable for envelopes furnished by some varieties of cigar tobaccos.—The following table indicates the classification by length of some of the tobaccos grown at the Farnham Station in 1913.

Names of Variety.	Position of Leaf.	Length in Inches.								Rejected.	Total Weight.
		14	16	18	20	22	24	26	28		
											Lb.
Yamaska	Head	25	44	88	33	35	.....	.....	.....	.....	225
	Middle	.....	32	127	361	277	93	.....	.....	.....	890
	Bottom	36	81	43	43	11	.....	.....	.....	.....	214
		61	157	258	439	321	93	.....	.....	.....	1,329
Big Ohio X Sumatra	Head	.....	54	192	114	47	4	.....	.....	.....	411
	Middle	.....	16	222	394	407	125	102	50	.....	1,316
	Bottom	42	80	70	72	33	.....	.....	.....	.....	297
		42	150	484	580	487	129	102	50	.....	2,024
Havana Seed Leaf	Head	11	8	25	34	68	21	15	.....	.....	182
	Middle	8	11	50	98	101	117	55	6	.....	446
	Bottom	.....	23	11	27	28	.....	.....	.....	.....	89
		19	42	86	159	197	138	70	6	.....	717
Comstock Spanish	Head	4	31	123	134	58	64	15	.....	.....	429
	Middle	6	15	93	224	534	347	246	55	.....	1,520
	Bottom	.....	55	49	124	.....	36	.....	.....	26	290
		10	101	266	482	592	447	261	55	26	2,239

If one considers as suitable for use as binders all leaves of a length of 18 to 24 inches, provided that they have a texture sufficiently tough and not too thick, it will be seen that the Havana Seed Leaf is decidedly superior. But if shorter leaves (16 inches), if fine and of a more rounded form than the Havana Seed Leaf, are accepted, the ideal type for binders would be represented by the Yamaska.

On the other hand, considering the relative position of the leaves on the stalk, it is difficult not to accept as fit for binders at least the 26-inch leaves of the Big Ohio Sumatra, those of the Havana Seed Leaf and of the Comstock. Such binders may be less in demand than those 18 to 24 inches in length, but they are certainly suitable for cigar making.

The relative proportion of binders furnished by these different varieties according to the manufacturer's grading, is as follows:—

Percentage of thin leaf, of good texture, elastic and pliant, comprised in the lengths given below.

—	18 inches to 24 inches.	16 inches to 24 inches.	18 inches to 26 inches.	16 inches to 26 inches.
	p. c.	p. c.	p. c.	p. c.
Yamaska	73 73	82 24		
Big Ohio Sumatra	73 51	78 26	78 55	83 30
Havana Seed Leaf	77 4	78 98	87 16	88 70
Comstock Spanish	74 27	74 94	86 18	86 60

The 18 to 24-inch leaves represent the true type of binder leaf; those from 16 to 24 inches include that part of the product which could be used for the purpose by manufacturers who value highly a thin binder and are not specially concerned as to its development; those from 18 to 26 inches would serve in part for machine work, owing to the proportion of large 24-inch leaves contained. As to the leaves from 16 to 26 inches, of which naturally the amount is greatest, they might be used by those engaged in the manufacture of varied tobacco products.

In the first case, if attention is paid to the qualities of the tissue of each variety, preference must be given to the Comstock Spanish; in the second case, to the Yamaska; in the third and fourth, to the Comstock Spanish again. The Havana Seed Leaf gives a product somewhat thicker, running fewer leaves to the pound, and hence not furnishing so many binders.

The preceding tables have been obtained by considering as leaves suitable for binders of the first mentioned class (18 to 24 inches), the top leaves of a length greater than 18 inches; among the middle and bottom leaves, those longer than 16 inches.

In calculating the second class (16 to 24 inches) the low leaves of 16 inches length have not been included in the case of the Havana Seed Leaf and the Comstock Spanish. The presence of a large proportion of 16-inch leaves among the middle leaves of these two varieties indicates that the 16-inch leaves classified as bottom leaves are lacking in substance and cannot possibly be classified as binders.

These relative proportions should not be considered as absolutely fixed. It is necessary to take into account the differences of seasons and the variations which may occur in varieties of which the type is not yet fixed, such as the Yamaska and the Big Ohio x Sumatra. The latter especially encourages the hope that among selections from it may be established a type with leaves a little shorter, perhaps, but of a more rounded and suitable form, which may take a better position in the 18 to 24-inch classification.

Moreover, we have not taken into consideration here the question of flavour and strength of these varieties when used as binders, a question of importance in the

16—1915—p. 1004.

Plants reserved for seed (Canelle). Central Farm, 1913.

Giant Herzegovnia. (Central Farm, 1913.)

16–1915–p. 1004.

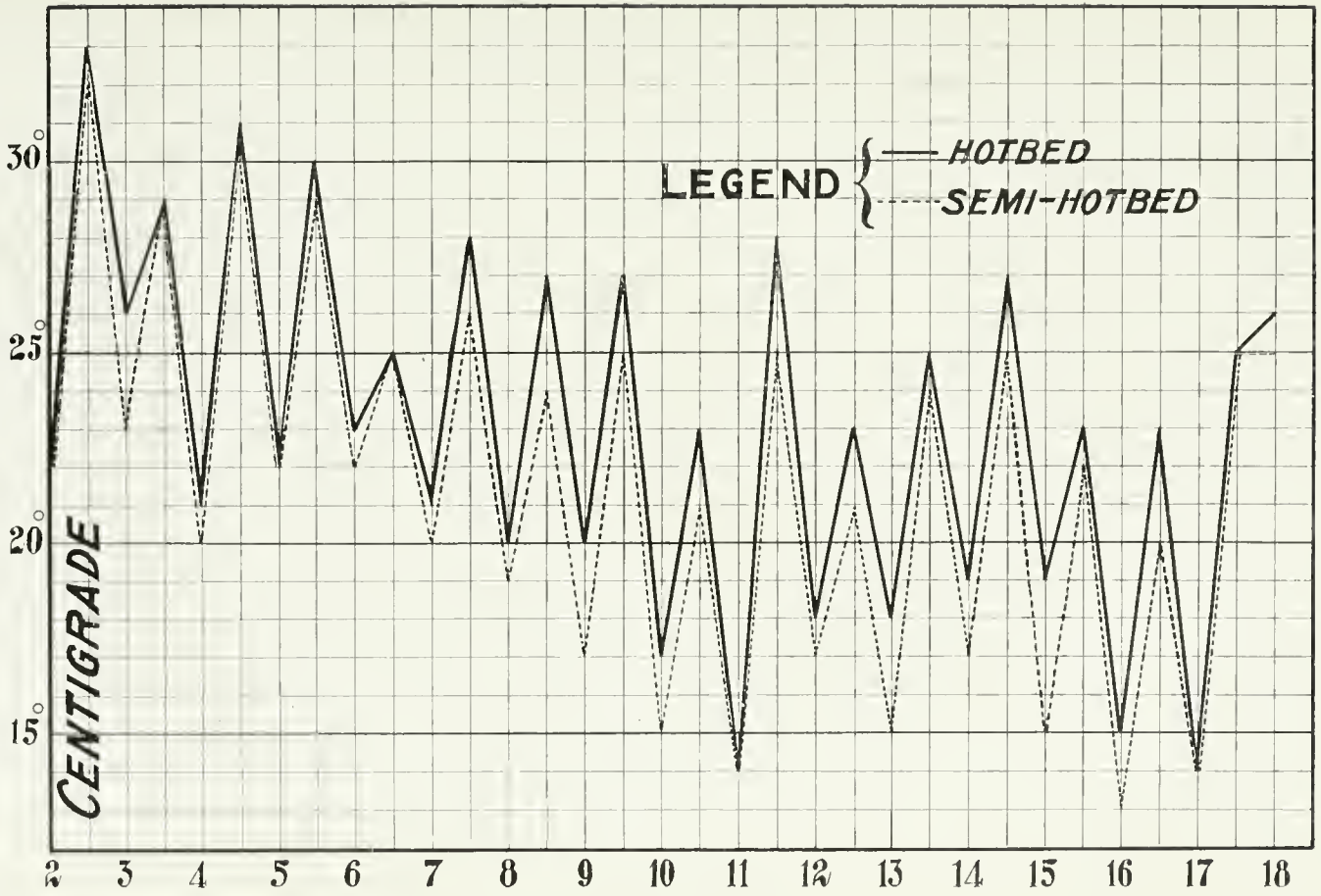

Diagram of Temperatures in the Beds from May 2 to 18, 1913 (Central Farm.)

manufacture of cigars, where they are associated with the tobacco of delicate aroma used as fillers.

Neither was any classification made, with the exception of an unimportant lot of rejected tobacco, into leaves absolutely intact, those in good condition and those torn by the wind. All the leaves harvested were regarded as intact. One must also take into consideration, therefore, the care taken in harvesting the crop both on the plantation and in the stripping room. As the proportion of torn leaves increases, that of the leaves suitable for binders diminishes.

We have simply attempted to show the relative value of the varieties tested for use as binders.

SEED DISTRIBUTION.

The number of application for tobacco seed received, and the number of samples sent out, are given in the following table:—

APPLICATIONS RECEIVED AND SAMPLES SENT.

Variety.	Number of Applications Received.	Number of Samples Sent.
Comstock Spanish	1,043	1,043
Canelle	1,189	1,189
Havana Seed Leaf	714	570
General Grant	250	141
Connecticut Seed Leaf	265	233
Connecticut Broad Leaf	218	183
White Burley	171	171
Cuban	47	47
Big Havana	52	27
Warne	12	12
Hazlewood	10	10
Connecticut Havana	2	2
Montmelian	2	2
Blue Pryor	3	3
Big Ohio	1	1
Verel	1	1
	3,980	3,640

Most of these demands gave rise to correspondence or the sending of circulars treating of the variety of tobacco asked for.

As usual, all the seed produced in 1913, with the exception of that obtained from individually selected plants, was passed through the separator.

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EXPERIMENTAL TOBACCO STATIONS AT FARNHAM, ST. JACQUES L'ACHIGAN, QUE.

REPORT OF THE MANAGER, O. CHEVALIER, I.N.A.

The 1913 tobacco crop was perhaps the best obtained in the province of Quebec for the last six years. This was especially the case in the Yamaska valley. The light snowfall of the winter of 1912-13 and the fairly early spring made it possible to prepare the land for crop very early. Unfortunately, the month of June was comparatively cold (for five days the temperature ranged between 48° and 60°) and, as a result, growth was delayed which in turn made the harvest much later than in a normal year. By an unfortunate coincidence, autumn frosts occurred much earlier than usual, and on September 8 a sharp fall in temperature to a minimum of 25° F. caused serious damage in many plantations. In the northern counties, the drought of July affected the yields somewhat but the damage from frost was not so severe as in the southern counties.

FARNHAM TOBACCO STATION.

SOWING.

The varieties sown at Farnham were as follows: For binders among others, the Comstock, Havana Seed Leaf, Big Ohio x Sumatra, and Yamaska which, it must be remembered, is a hybrid of Comstock x Sumatra. Among the "fillers" grown were the Cuban and two varieties of Brazil, the St. Felix and Las Almas.

All the seed-beds, measuring 15 feet by 5 feet each, were treated in the same way. Mould of a suitable richness had been prepared the previous autumn and cleared of weed seeds. The beds were made without manure or chemical fertilizers; a bed of tobacco stems alone formed the foundation, in short the bed was of the type which it has been agreed to call the semi-hot. For an experiment, two beds of the simplest character were tried; they were made of ordinary earth simply, well sifted and placed in the frames without manure, chemical fertilizer or tobacco stems. These gave results at least as good as did the other beds.

When prepared, on April 14, all the beds were subjected to the influence of the sun for four days, and were sown on April 17 and 18 at the rate of one-seventh of an ounce of seed for 100 square feet of bed, the grain being slightly swelled.

The beds, twenty in number, each 15 by 5 feet, were divided as follows:—

Bed No.	Variety.	No. of Beds.
1, 2, 3,	Comstock	3
4, 5,	Havana Seed Leaf	2
6, 7, 8,	Yamaska	3
9, 10, 11, 12,	Big Ohio x Sumatra	4
13, 14, 15,	Cuban	3
16,	St. Felix	1
17,	Las Almas	1
18,	Carelle	1
19,	Erbasanta	½
	Makhorka	½
20,	Big Ohio	⅓
	Comstock	⅓
	Sumatra	⅓

The plantation of Canelle was intended for the production of seed; those of Erbasanta and Makhorka with a view to the study of their nicotine content and, lastly, those of Big Ohio, Comstock and Sumatra in order to make new hybrids of Big Ohio x Sumatra and Comstock x Sumatra for comparison with the hybrids of those varieties already made and on which four years' selection had been made. Germination was uniform and good on all the beds between No. 1 and No. 12. The "filler" varieties, Cuban, St. Felix, and Las Almas, which are a little later, required eleven days for germination. Beds 18, 19, and 20 germinated a day later than the above, except the Big Ohio and the Comstock, where germination took place eight days after sowing: in brief, by April 29, germination was general in all the beds.

The next operation was weeding which, owing to the good condition of the beds, was not very long or labourious. Immediately after, by means of a screen, a light covering of very fine earth was spread over all the beds in order to fix in place any young plants which the weeding operation might have disturbed. The plants were watered, with water slightly warmed, twice a day, about 10 a.m. and 3 p.m. A large kettle was placed among the beds, over a brick fireplace, which rendered the watering easy.

In general, the plants made rapid growth in the beds. The Cuban and the Brazils were, however, very slow, and the Rusticas, the young plants of which were very pale in colour, developed very quickly. In the latter case, foreign seed had been used, and it is possible that its germinative power had been impaired and that more seed should have been sown.

The beds were aired every day, the length of time depending on the outside temperature. It should be remembered that plants breathe and that it is dangerous to allow them to develop in a confined atmosphere.

A very thin covering of white cotton placed between the frame and the seedling protected the latter from the sun, and each evening the frames were covered with a thicker cloth of a dark colour to reduce as much as possible the radiation of heat during the night.

Having adopted this special system of beds, the variations in inside and outside temperature were followed very closely. Two maximum and minimum thermometers were placed in the beds, and one on the outside. The highest and lowest temperatures both inside and out were taken every day, and the variations are indicated in the diagram.

As will be seen, the maximum temperature in the beds never exceeded 86°F. The minimum of 33° was observed during the night of May 17, on which date a minimum of 30° was noted outside. In a neighbour's beds, which were made very warm, the thermometer also recorded 33°. One should not, therefore, lay too much stress on the importance of manure as a heat preservative. For this purpose, tight frames, well-built sashes and sunshine are the principal factors to rely on.

Much has been said and written on the subject of beds, but the question is still unsettled. In our opinion, the purpose of the bed has been a little misunderstood. They are, in short, a means, not of forcing the development of the plant but of allowing it to grow under as normal conditions as possible; the beds are made not to stimulate artificially the plant's growth but to permit it to develop in the way it has been accustomed to, because in our country we cannot grow the tobacco seedling in the open air without subjecting it to severe set-backs. The beds, in a word, are a means of sheltering the plant from the unfavourable weather conditions generally prevailing in April. In our opinion, the ideal aimed at should be to remove the plant as little as possible from the natural conditions of growth, while taking all necessary precautions to protect it from extremes of temperature. Now, the best way would be to place the seed in the open ground and allow it to develop naturally, which is the reason why the simple form of bed described above was tried. In short, the beds

allowed of growing the plants under shelter; but in a normal year the value of manure, chemical fertilizers, and sprinklings with nitrate of soda or other fertilizing material, was not apparent.

Moreover, it is in approaching natural conditions as nearly as possible that we can maintain the vigour and vitality of the plant; it is under these conditions that the plant will thrive, which is in itself one of the surest methods of selection, and it is also, in our opinion, the surest means of rendering it resistant to all the diseases, fungous and otherwise, to which the tobacco plant in the hotbed is subject.

Outside of the beds of Brazil and Cuban, which showed an evident tendency to grow spindling, all the beds produced plants which were healthy, vigorous, and with a good root system. There was not the least trace of disease or feebleness, the plants were not even yellowed, and it was not necessary to choose the plants for planting out, but they were taken as they came. The plantations on the Station required 105,000 plants and, in addition to that, neighbouring planters, whose beds had failed, were given 52,000 plants. In some of their beds the plants had been attacked by rot, owing to the bed having been too compactly made; among others, the plants were spindling, sickly, and seemed very unlikely to recover if planted out.

DISEASED SEED BEDS.

It has been noticed among neighbouring planters that the beds are sometimes attacked by rot. This is due to the bed being too thick, too hot, and too moist. To a certain extent the spread of the malady has been stopped as follows: Take out all the affected plants and even a part of those which appear sound, around the affected area, the affected section of the bed with water containing one-half per cent formalin. In seven beds so treated, six were completely cured.

On an average, it was calculated that on each of the first fifteen beds at the Station, 12,000 plants of excellent quality were obtained. The two special, or cold beds, as they may be termed, gave 18,000 and 16,000 plants, respectively.

PREPARATION OF THE LAND.

During the development in the seed-beds, the land for the plantation was prepared. A field of 8 arpents[1] was worked up and manured before winter set in. This field, which had previously been in hay for fourteen years, received 20 tons of manure per arpent, after which the land was ploughed 7 inches deep. Another field of five arpents had been fall-ploughed only. We were unable to plough under manure on this area until the spring of 1913, and then only 3 of the 5 arpents were so treated. The whole plantation received a treatment with chemical fertilizer, made up as follows, per arpent:—

300 pounds sulphate of ammonia.
200 pounds sulphate of potassium.
148 pounds superphosphate.

This may be regarded as a heavy application, but it should be remembered that while the soil on the Farnham Station has remarkable physical qualities, it was in a deplorable state as regards fertility.

On May 23, the land was ready for planting. It had received two harrowings with the double disc, two with the ordinary harrow and a cross-harrowing to cover the chemical fertilizer.

OTHER CROPS.

Some time previous to this, preparations for sowing had been made. Thirty arpents were ploughed, harrowed, rolled, and sown to oats and clover at the rate of 2 bushels of the former and 15 pounds of the latter per arpent. Germination was

[1] An arpent contains 36,806·42 square feet; an acre, 43,560 square feet. One arpent = ·8,449 acres; one acre = 1·1803 arpents.

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good, but weeds caused considerable trouble, especially mustard, bindweed and thistles. However, 19,500 pounds of oats were harvested, of which 7,500 pounds were sent to the Central Farm at Ottawa, and the remainder kept at Farnham to feed the horses. This is an average of 20 bushels per arpent, with an average weight of 35 pounds per bushel. The whole 30 arpents varied in fertility, however. Eight arpents yielded at the rate of 38 bushels each, and 15 others only gave 15 bushels per arpent. The catch of clover was excellent, and at the end of October the plants were 6 inches high.

Four arpents more, recently broken, and of a sandy character, were sown twice to buckwheat. This was ploughed under each time. The treatment served to destroy weeds to a considerable extent and to increase the fertility of the soil. This part of the farm was manured in the fall, and will be sown this spring to oats and clover, which, if necessary, will be treated with a topdressing of nitrate of soda.

PLANTATION.

On May 25, 12,000 plants had been taken from the beds and were ready for setting out. The heavy rain of the 26th prevented this, and the land had to be prepared again. The weather remained wet and cloudy and, notwithstanding our efforts, the soil remained too wet for planting with the machine. It was necessary to plant by hand. Four men planting and two assistants were employed in this work. Eight days after, all the "filler" varieties were planted, that is to say, 2 arpents of Las Almas, 2 of St. Felix and 2 of Cuban. The planting of these three varieties was done in the same manner, the plants being placed 18 inches by 30 inches apart. As it was planted, the ground was sprinkled with a mixture of corn meal and Paris green. This had to be repeated, the first application being spoiled by the rain.

Owing to the damp, cloudy, warm weather, the transplanting was very successful. Unfortunately, insects, and especially cutworms did great damage, and it was necessary to replace some 70 per cent of the plants.

On June 3, the planting of the "binders" varieties was begun. This was done entirely by machine, the plants being placed at the usual distance, namely, 18 inches by 30 inches.

The soil was in very good condition and moist enough to render the application of water unnecessary. The rains of the 8th, 9th, and 10th of June delayed planting, which was finished on the 15th. The planting done was:—One arpent of Havana Seed Leaf, 2 of Comstock Spanish, 2 of Yamaska and 2 of Big Ohio x Sumatra; as in the previous case, the Paris green mixture was used several times. Insects did less damage than in the other plantation, and only about 30 per cent of plants required replacing. Generally speaking, the transplanting was successful. Hot weather commenced at this time, and everything promised well.

Beside the main plantation a supplementary one was made of the following varieties:—

600	plants	of	Erbasanta
600	"	"	Makhorka
1,000	"	"	Canelle
300	"	"	Sumatra
300	"	"	Big Ohio
300	"	"	Comstock Spanish

The two first-named varieties could not be harvested; they were too late and the frost of September 8 had practically destroyed them.

We were able to hybridize fifty flowers of Comstock and forty-two of Big Ohio. This was attended with considerable difficulty as the Sumatra variety flowers long after the Big Ohio and Comstock. However, in the first case, success was obtained with forty-eight seed capsules and in the second, with thirty-five. The seed pods were well on towards maturity when the frost of September 8 destroyed all seed formed.

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Warm weather arrived on June 15, but its duration was short, and the remainder of June was rather cold so that the plantation made slow growth during this time. For five consecutive days the temperature ranged between 48° and 60° F., and, as a result, growth received such a set-back from its beginning that only a small part of the plantation regained the ground lost, and harvest was from fifteen days to three weeks later than in a normal year.

By July 1 the plantation had been gone over twice with the horse weeder and once by hand. The plantation of "binders" was in good shape, but that of the "filler" varieties was very weedy and it took a great deal of labour to clean it.

At the beginning of July, the following notes were taken on the condition of the plantation: The Comstock is the most advanced in growth, followed quite closely by the Havana Seed Leaf. The Yamaska is a little later, and the Big Ohio x Sumatra maintains its special character of being slow to commence, but afterwards becoming the most rapidly developing variety of all. The Cuban appears earlier than the other "filler" varieties. The St. Felix especially is very slow at commencement; however, it was generally true this year that the Brazil varieties seemed to be paralyzed at the beginning of their growth. An arpent of St. Felix on which 648 pounds of chemical fertilizer had been applied, but no barnyard manure, has a very poor appearance, while another arpent of the same variety which had been manured seems to promise better.

About this time, July 2, conditions became very favourable for growth. Warm weather, followed by warm and frequent showers, gave the plantation a vigorous growth which it maintained up to harvest.

During August, the choice of seed plants was the main occupation. After a long and careful selection, 2,000 plants were reserved. Unfortunately, the frost of September 8 almost completely destroyed the results of this work, for very few seed pods escaped and the small amount of seed harvested had to be examined very critically before being used. The 2,000 plants reserved for seed were as follows:—

800 Comstock	200 Havana Seed Leaf
400 Yamaska	100 Cuban
400 Big Ohio x Sumatra	50 St. Felix
	50 Las Almas.

The various cultural operations performed during the season are tabulated below:—

CULTURAL OPERATIONS PERFORMED.

Variety.	Planted.	Area.	Weeding.	Topping.	Suckering.	Harvested.
		Arpents				
Havana	June 3 and 5.	1	3, with horse-weeder.	July 29.	Aug. 13 to 26, Sept. 4. Sept. 4	
Comstock	" 4.	2	4, by hand.	" 29.	Aug. 13 to 26, Sept. 4.	" 4.
Yamaska	" 11 and 13	2	...	" 30.	Aug. 16 to 30, Sept. 6.	" 6.
Big Ohio x Sumatra	" 6 and 7.	2	...	" 31 and Aug 1.	" " "	" 7.
	May 30.	2	5, with horse-weeder	Aug. 4.	Aug. 18 Sept. 1 and 9	" 9.
St. Felix	" 28.	2	6, by hand ...	" 6.	" " "	" 11.
Las Almas	" 31	2	" " ...	" 6.	Aug. 20, Sept. 2 and 11	" 13.

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The transport of the tobacco to the drying room was done quite rapidly by a new method to which reference will be made later on. The curing was considerably aided by the remarkable autumn weather.

In short, it may be said that the summer of 1913 was hot and moist, giving the tobacco excellent growing conditions. The harvest gave a product which was well developed, gummy, thin, and with good qualities of tissue.

While the drying process was going on in October, 15 arpents of land were underdrained, requiring 9,000 feet of tile. The main drains are of 6-inch tile and the laterals of 3-inch. The former are 2,480 feet in length and the latter 6,250 feet. Numerous tests on the area to be drained were made to get information as to the nature of the soil, which was found to be composed of a topsoil 9 inches deep, composed of a mixture of sand and clay, grey in colour, and very light. This rests upon a yellow fine sand, 18 inches thick. Then comes a blue sand, a little coarser and slightly marly. The same formation is found down to the water table, that is, to a depth of 4½ feet. Following these indications and those furnished by a careful levelling, the plan adopted was as follows: The lateral drains were arranged to follow the line of greatest fall, and had a maximum length of 350 feet. They were placed at an average depth of 3 feet and only in one very low spot, about 34 feet in length, do they reach the water table. They are spaced uniformly 60 feet apart; the fall, which gradually increases, in no instance exceeds .06 per cent. They enter the main drains at an angle of 30 degrees, the obtuse angle being on the higher side. The joints are made telescopic, the upper part of the lateral drains being on a level with the upper part of the main drain.

The whole drainage installation is made up of two systems, each composed of nine laterals, emptying into a main drain. The two mains unite and empty into a discharge by a glazed tile drain 7 inches in diameter. This discharge is a ditch running along the property and emptying into the river Yamaska.

At each meeting point of the main drains or collectors, an inspection well, 8 inches in inside diameter, has been placed. The levelling of the land, the locating of the trenches, the calculation of fall, the placing of the tile, the filling of the trenches, the construction of two inspection wells, and the clearing of the discharge ditch took over four weeks' work.

This drained area will be planted in tobacco next year (1914); the manure required was applied and ploughed under by November 17.

As soon as the drying process was finished, stemming was commenced, and sorting was carried on as fast as the stemming was done. The stemmers, three in number, separated the top, middle, and bottom leaves. The sorting force was made up of four classifying by colour and four by length, leaves of the same length being made up into small bundles or "hands", the work being carried on as follows: In each group of top, middle, and bottom leaves, respectively, the deep-coloured leaves were separated from the light-coloured; then, in each of the two groups so formed, three divisions were made, the first made up of those leaves absolutely whole, the second of those leaves of which at least half was untorn, and third, of the torn leaves. All were then sorted according to length, 16 inches, 18, 20, 22, etc. All leaves of the same length were made into "hands" together. The crop was then baled and lightly pressed and sent to the Central Farm at Ottawa for fermentation, arriving at the end of January.

Placing in the Curing Shed.

The best method of getting the tobacco moved into the curing shed from the field is yet unsettled. The crop is necessarily subjected to many manipulations and consequently to damage, to which it is susceptible.

A new method was tried this year of placing the tobacco in the curing shed. A movable framework was put on the wagon to receive the laths loaded with the tobacco

and, at the curing shed, a simple arrangement of pulleys, chains, and rails allowed of the whole being raised at once to a position near where the tobacco was to be placed in the shed. This did away with unloading lath by lath, which is slow, laborious, and sometimes dangerous as well.

The number of handlings of the laths required to place them in the curing shed was thus reduced considerably, and two men were sufficient for the work, even when filling the upper part of the shed. A single pulley was used, although a double one would be of advantage in reducing the amount of effort needed. As soon as the load is lifted off the wagon, another frame is placed thereon and it is ready for another trip, so that very little time is lost at the curing shed. With the system used, it takes twenty-five minutes to place twenty-five laths in the upper part of the curing shed; the load is raised in three minutes, and while the wagon is away for another load the men have plenty of time for storing the first load. For the same amount of work, three men and one horse fewer are required. Doubtless, perfection has not yet been reached, but a year of practical trial of this method, during which we have constructed a suitable wagon and regulated the mode of work, has enabled us to recommend its adoption.

An improvement in the curing shed worthy of mention has also been made. The Farnham shed has six curing tiers and hence six ranges of ventilators throughout. The lower ventilator is regulated by hand, the others are manipulated all together, this being the improvement referred to, since the use of ladders is done away with and the control of the drying process is regulated much more quickly. Each ventilator has an iron brace jointed to a long iron rod, which makes all solid. A counterpoise of a certain weight, attached to the upper end of the rod by a wire cable running through a small pulley, allows of the easy regulation of the ventilator openings. A hook permits of keeping the ventilator in any desired position.

The management of ventilators has always been an important question among tobacco planters, and the system here described may be recommended.

IMPROVEMENTS TO THE STATION.

Besides the work in agriculture, a considerable amount of time was devoted to the improvement of the Station itself. All the fences were renewed, 8-foot cedar posts being used and wire fencing eleven strands high. The posts were placed 3 feet in the ground and 16 feet apart. Sixteen-foot gates give entrance to the various parts of the Farm. On each side of the road, turned posts were used joined together at the top by 3 inch by 2 inch scantling to which the fence is nailed. On the rest of the Farm, the posts were peeled only.

Part of the Station is occupied by a ravine, at the bottom of which there is a fairly large ditch. Steps were taken this year to put this land under cultivation, it having produced heretofore only a poor quality of hay which had been used as litter. A dam 45 feet long has been built, containing a 4 foot sluice-gate to regulate the discharge of the water in such a way that the land above the dam can all be covered with water. It is calculated that on all this land, a depth of about a foot of water can be maintained for some time. The ditch in question runs for 16 miles through a low-lying and fertile region, and passes through the property of the Canadian Pacific Railway works and the northern part of the town of Farnham. It carries with it a great amount of sediment and debris of all kinds, of great fertilizing value. Although, to facilitate the working of the land, it may be necessary to straighten this ditch, the course of which is rather winding, much is hoped for from this fertilizing deposit, which will enable us to increase by 4 arpents the arable land of the Station. Special attention has been paid to the discharge ditches. After several representations had been made, the Canadian Pacific Railway and the Central Vermont railways did the

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Field of the Brazil variety, grown on land treated with chemical fertilizer only. (Farnham Station, 1913.)

Plot of Comstock, grown on land treated with barnyard manure and one application of complete chemical fertilizer. (Farnham Station, 1913.)

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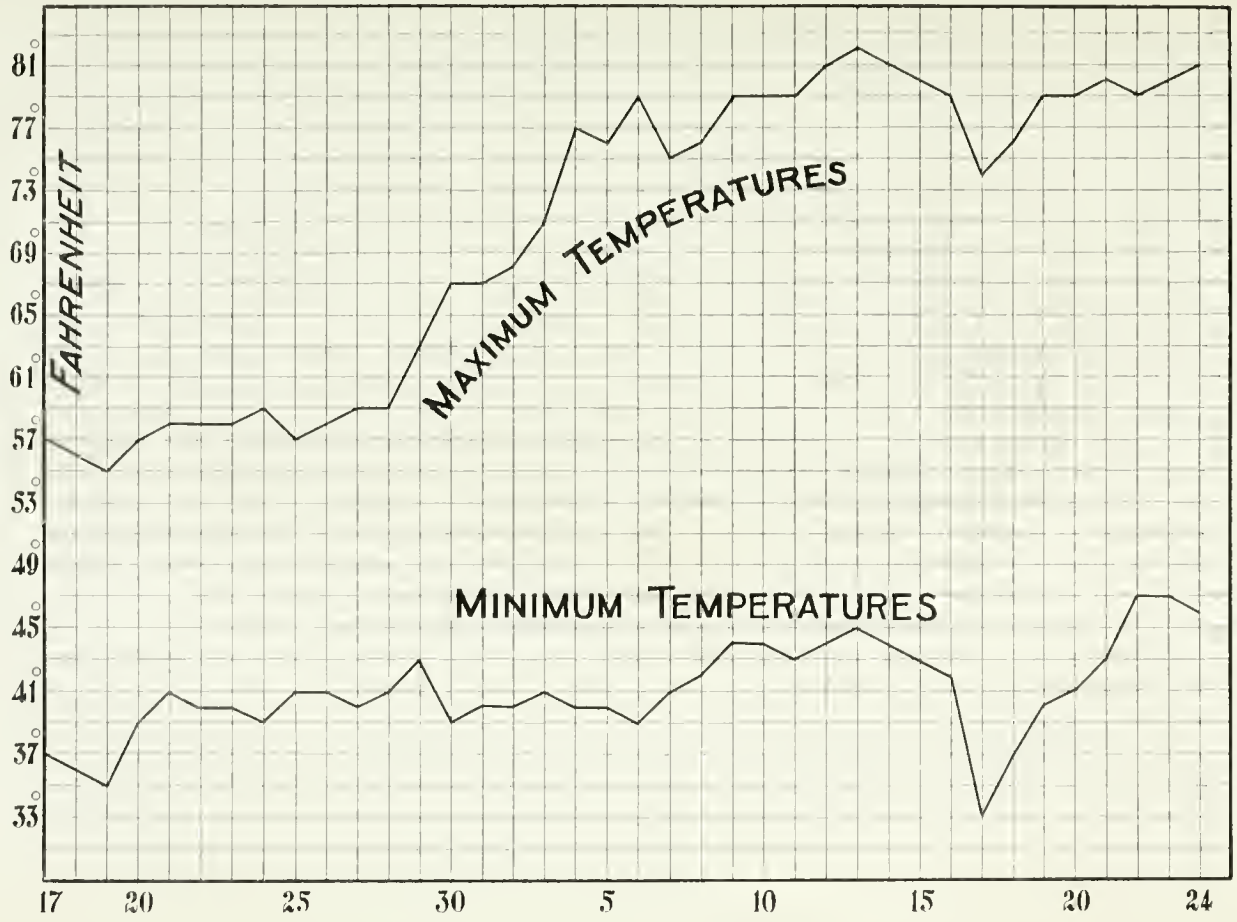

Diagram of temperatures of beds from April 17 to May 24, 1913. (Farnham.)

necessary work to ensure a rapid running off of the waters which for a long time had flooded our land, owing to lack of a means of escape. Frequent attempts were made to induce neighbouring farmers to destroy weeds upon their farms, and the borders of the Station were mowed three times with this end in view. In September, the corporation of Farnham promised a water service for the Station, and put in two hydrants; they also, at our expense, put in electric lighting in the sorting room, the implement shed, the stable, and the granary.

YIELDS AND RATINGS OF VARIETIES GROWN.

It will be remembered that the Farnham Station was in poor condition when taken over by the Federal Government. That section where the plantation of tobacco for binders was made had not been cultivated for fourteen years. It will readily be granted that such land cannot be put into good condition in two years. For this reason, the crops this year, although quite good, are not yet what they should be. It may also be stated that the 2,000 plants kept for seed production had an appreciable influence on the total yield. They represent the crop on almost one-third of an arpent.

BINDERS.

Big Ohio x Sumatra.—Two arpents of this variety produced 2,139 pounds, or an average of 1,070 pounds per arpent. The 2,139 pound were made up of:

Top leaves, 430 pounds or 20 per cent.
Middle leaves, 1,430 pounds or 66 per cent.
Bottom leaves, 279 pounds or 13 per cent.

The whole harvest gave 1,419 pounds of thin leaves or 66 per cent, and 720 pounds of thicker, darker leaves, or 33 per cent.

In the top leaves, 182 pounds were classed as No. 1, 210 pounds as No. 2, and 38 pounds as No. 3.

Among the middle leaves, 316 pounds were classed as No. 1, 839 pounds as No. 2, and 275 pounds as No. 3. Among the bottom leaves, Nos. 1, 2 and 3 contained respectively: No. 1, none; No. 2, 131 pounds; and No. 3, 148 pounds.

Yamaska.—The Yamaska gave a total yield of 1,356 pounds divided as follows:—

Top leaves, 239 pounds or 17 per cent.
Middle leaves, 886 pounds or 65 per cent.
Bottom leaves, 233 pounds or 17 per cent.

Of this variety, 331 pounds of thin leaves were gathered, or 24 per cent, and 1,025 pounds of darker and thicker leaves, or 75 per cent.

The top leaves gave 81 pounds No. 1, 121 pounds No. 2, and 35 pounds No. 3. The middle leaves gave 288 pounds No. 1, 440 pounds No. 2, and 158 pounds, No. 3, and the bottom leaves, 66 pounds, 97 pounds, and 70 pounds, of Nos. 1, 2, and 3, respectively.

Comstock.—The total yield of Comstock was 2,383 pounds, or an average of 1,191 pounds per arpent, made up as follows:—

Top leaves, 443 pounds, or 18 per cent.
Middle leaves, 1,611 pounds or 67 per cent.
Bottom leaves, 302 pounds or 14 per cent.
Rejected, 27 pounds or 1 per cent.

The total yield gave 1,239 pounds of thin leaf of light colour, or 52 per cent, and 1,117 pounds of darker and thicker leaves, or 47 per cent.

FARNHAM.

As to the quality, the sorting gave the following results:—

—	No. 1	No. 2	No. 3
	Lb.	Lb.	Lb.
Top leaves	172	180	91
Middle leaves	356	820	435
Bottom leaves	50	156	96

Havana Seed Leaf.—The yield of this variety was 779 pounds, for 4,500 square feet only, which would give a yield per arpent of 1,384 pounds.

This gave after sorting:—

Top leaves, 186 pounds, or 24 per cent.
Middle leaves, 485 pounds, or 62 per cent.
Bottom leaves, 96 pounds, or 12 per cent.
Rejected, 12 pounds, or 1·5 per cent.

Leaves thin and light coloured, 176 pounds or 22 per cent; leaves thick and dark, 591 pounds, or 77 per cent.

—	No. 1.	No. 2.	No. 3.
	Lb.	Lb.	Lb.
Top leaves	77	82	27
Middle leaves	165	262	58
Bottom leaves	45	24	27

FILLERS.

Cuban.—The total yield was 275 pounds, made up of:—

Top leaves, 109 pounds, or 39 per cent.
Middle leaves, 121 pounds or 44 per cent.
Bottom leaves, 45 pounds or 17 per cent.

These were classified as follows: No. 1, 36 pounds; No. 2, 195 pounds; and No. 3, 44 pounds.

St. Felix.—The yield of St. Felix was 209 pounds, which were classified as top leaves and middle leaves. All the bottom leaves were of sufficiently good tissue to be classed as middle leaves.

Top leaves, 12 pounds or 5·7 per cent.
Middle leaves, 197 pounds or 94 per cent.

These were classified for quality as follows: No. 1, 148 pounds; No. 2, 61 pounds; and No. 3, none.

FARNHAM.

Las Almas.—Total yield, 349 pounds, made up as follows:—

Top leaves, 80 lbs., or 23 per cent.
Middle leaves, 231 pounds, or 66 per cent.
Bottom leaves, 38 pounds, or 10 per cent.

The quality was classified as follows: No. 1, 113 pounds; No. 2, 212 pounds; and No. 3, 24 pounds.

REMARKS.

In considering the varieties grown for binders, it is seen that the Big Ohio x Sumatra has given the best results from the point of thinness of tissue. It gave 66 per cent of thin leaves as against 52 per cent for the Comstock.

The Yamaska and the Havana Seed Leaf are much thicker and gave results almost equal, 24 per cent for the former and 22 for the latter.

The Big Ohio x Sumatra, however, is still a little lacking in strength and toughness. Every year, an improvement is noted in this regard and it is hoped, by continuing the work of selection, to arrive at the true type of binder tobacco.

The very small proportion of rejected leaves may be noted as showing that the harvest was handled with care.

It will also be noted that the percentage of middle leaves is much the highest. From this point of view, all the varieties gave practically equal results. This is indicative of a good harvest, for the uniformity of product is the result of having the highest proportion possible of middle leaves. To obtain this result, careful pruning is necessary, and sufficiently low topping.

The binder tobaccos gave a total yield of 6,657 pounds, of which 1,798 pounds, were classed as No. 1, 3,362 pounds as No. 2, and 1,458 pounds as No. 3. As will be noted, 50 per cent of the crop was classed as No. 2. This seems a high percentage, but it may be mentioned that, notwithstanding, a much more severe sorting out was made than is generally done in commercial tobacco growing. In the latter, one considers as No. 1 every leaf, half of which at least is intact, while the No. 1 here reported on contains only leaves absolutely whole.

TOBACCO STATION AT ST. JACQUES L'ACHIGAN, QUE.

At this Station, the varieties studied during 1913 were the Comstock, Aurora, and Cuban.

SEED-BEDS

The six seed-beds used, each 5 feet by 21 feet, were treated and used as follows:—

The mould, which had been placed in a heap the previous autumn, was spread out during the first days of April and, as soon as thawed out and warmed was placed in the frames, where it was left for further sun action for six days. Only the semi-hotbeds were used; the bottom of the seed-bed is separated from the solid ground by a fairly thin layer of tobacco stems. The Victor brand of fertilizer was used at the rate of 1 ounce to each square foot of bed. The sowing of all six beds was done on April 18, with favourable weather.

The seedlings of Comstock especially looked well, while the Aurora and Cuban appeared sickly. Weeding was done as usual although the beds were not very weedy since the same mould had been used each year for three years, during which time it had been cleared of a great number of weeds. As at Farnham, the beds were watered lightly and often, with slightly warmed water. As soon as the temperature outside permitted, air was admitted to the seedlings. The thermometers placed in the beds never registered more than 83 degrees, and the minimum temperature, 32½ degrees, was observed on May 18.

This was very near frost, but the seedlings did not appear to have suffered greatly, except the Aurora. After May 10, the seedlings of Aurora seemed arrested in growth, and many of them commenced to die. An application of hen manure in the proportion of one in ten, and of nitrate of soda, was without result, and only a few hundred plants were saved. This necessarily reduced the plantation of Aurora, but the seedlings of Comstock were plentiful and enabled the planting of four arpents of tobacco, as had been planned.

PLANTATION.

Spring conditions were favourable enough to permit of the preparation of the land in good time. Unfortunately, the municipal regulations of Montreal do not permit of the loading manure at the Great Northern station, except in winter. This prevented the usual application of barnyard manure to the land. To make up for this, as far as possible, the amount of chemical fertilizer applied was increased, but with only fair results.

The planting, finished June 12, comprised: Three arpents of Comstock Spanish, one-quarter arpent of Cuban, and one-sixth arpent of Aurora.

The work was done entirely by machine, under favourable conditions. Not many plants had to be replaced. The cut worms and wire worms are becoming more and more rare, which would lead to the belief that the application of Paris green and also the three-year rotation followed are very efficacious against insect spread. At St. Jacques, as throughout the Yamaska valley, the month of June was exceptionally cold, and consequently unfavourable to the plantations. July was very hot, but very dry as well, so that it may be said in a general way, that at the beginning of August, the plants were practically a month behind in growth. The heat and rain of August gave a good impulse to growth, but so late that the yields were much below what they should have been. The curing process, favoured by a long autumn of good weather, generally went

on well. The tobacco had a very good colour but, owing to the prolonged drought, the leaves were too thick and frequently lacked elasticity.

After a severe selection, 200 seed plants were reserved, which gave 8 pounds of seed of the first quality.

CROP RETURNS.

The total tobacco crop at St. Jacques amounted to 2,719 pounds, made up as follows:—

2,320 pounds of Comstock Spanish.
205 pounds of Cuban.
115 pounds of Aurora.
79 pounds of Comstock (leaves detached from the seed plants).

The whole harvest was sent to the tobacco warehouse at the Central Farm, Ottawa, arriving there the last of December.

The 2,320 pounds of Comstock was classified as follows:—

486 pounds top leaves.
1,347 pounds middle leaves.
487 pounds bottom leaves.

As will be noted, 58 per cent of middle leaves were obtained, a very good proportion. At Farnham, the proportion of middle leaves is much higher, as the conditions for growth are much better, the topping is done lower down, and the pruning higher up.

Soon after the harvest, the land was ploughed, and the area which will be in tobacco in 1914 was manured at the rate of 20 tons per arpent, and turned under by a deep ploughing of 9 inches, finished the end of October. The mould for the beds was then treated with formalin, and is ready for the work of 1914.

TOBACCO STATION, HARROW, ONT.

REPORT OF THE MANAGER, W. A. BARNET, B.S.A.

Considering this particular section of the county, the season of 1913 was a very unfavourable one for the successful culture of tobacco and, generally speaking, conditions in other parts of southwestern Ontario were the same.

The spring opened out as early as usual and very favourable weather prevailed during the fore part of the season for the growth of the young seedlings, so that in some rare cases where beds were sown very early, planting was begun in May. Despite the fact that many beds made apparently good progress there was the usual scarcity of plants just when they should be plentiful and planting carried on to the fullest extent. On account of the shortage of seedlings the acreage of Burley was smaller than in the previous year. During a period of four weeks from the latter part of May till the 21st of June there was a continued drought. The weather conditions necessitated an unusual amount of care in the watering of beds, especially those covered with glass, and made conditions very unfavourable for securing a uniform stand in the field.

THE ORCHARD.

On April 23 the whole orchard was sprayed for the San José scale, and again later for the Codling moth. A light pruning was given the apple trees. The peach trees planted in April, 1911, made a splendid wood growth. A hoed crop of Warne tobacco was grown in part of the orchard. In the balance of the area clean cultivation, followed by a seeding of Hairy Vetch for a cover crop was the practice. There was a large yield of apples but they were of poor keeping quality, a large percentage of the Northern Spy variety rotting on the tree. A few scattering peaches were found in the young orchard.

CORN EXPERIMENTS.

Part of the area in corn was manured at the rate of twelve loads per acre. The balance of the ground, 4 acres, had been manured the previous year for tobacco, and fertilized for corn as follows: 100 pounds muriate of potash and 275 pounds superphosphate per acre. The latter area planted with Golden Glow variety was not damaged badly by the hail-storm, and yielded 100 bushel baskets per acre of good sound corn, but the balance of the ground planted with Improved Leaming yielded only about one-half a crop. The severe wind and hail-storm of August 3 broke off a large percentage of the stalks and, for the most part, the leaves were torn and actually stripped off the standing stalks. Then again, where the ears were struck by the hailstones they were deformed and never developed as they would have done. Consequently the yield was diminished and the proportion of reliable seed was quite small.

DRAINAGE WORK.

A system of main drains was started but the work was not completed owing to a small delay getting a satisfactory outlet. The balance of the main drain will be completed and the laterals put in this coming spring. Cement curbed sand traps were put in at intervals along the main. It has been noted that although the drains were put

in with a fall of but 1 inch to 100 feet they were working quite successfully, carrying the water into the sand traps, the bottom of which is composed of a coarse gray sand, a porous filter.

PLANT BED EXPERIMENTS.

As in former years, plants sold at a premium just at planting time, the demand was keen, seedlings selling up to $3 per thousand. Despite the fact that some of our beds did not do as well as was expected, there was sufficient to plant the 9 acres of Burley and about 6 acres of Warne without having to do any buying.

Different Kinds of Plant Beds Established.—Sixteen hundred square feet of beds were established according to the following methods:—

1. Hotbed with cotton covering.
2. Cold bed with glass covering.
3. Cold bed with glass covering and different proportions of home-mixed fertilizer applied.
4. Cold bed, glass covering, with a thin layer of black virgin soil applied.
5. Cold bed, glass covering, using the ordinary sandy loam soil, manured and fertilized.
6. Cold bed, cotton covering, no fertilizer applied but heavily manured, and a layer of black soil used on the surface of the ordinary soil.

Bright Tobacco Beds.—On April 17, eight beds, 560 square feet were fertilized and sowed as follows:—

5 beds dry seed, Warne variety.
2 beds swollen seed, Virginia Erzegovine.
1 bed swollen seed, Virginia Erzegovine Gigante.

The above beds were fertilized at one-twelfth pound per square foot with the single fertilizers, sulphate of potash, nitrate of soda, and superphosphate mixed in equal proportions by weight. Black soil was applied to the ordinary soil, the fertilizer applied to the top layer and raked in lightly. The soil was firmed with plank after sowing.

The seed came up uniformly and made a good growth till the leaves were the size of a half-dollar, when growth was retarded despite the fact that a solution of nitrate of soda was used in watering and close attention was given to the beds. The leaves had a dark green cast, and the plants were the thick stalky type. On examining the roots of specimens, it was found that the root system was not developed, particularly there was an absence of the ramification of the fine rootlets. Again, the ends of the main roots and even the extremities of the fine root hairs presented a dark, dead appearance, as though they had been burned. It was noted that the new types of Virginia Erzegovine and Virginia Erzegovine Gigante did not show the effects of the disease, although both the Warne and the latter-mentioned types were sown on soil which had received exactly the same previous treatment. Upon investigation it was found that the disease in question was bed root rot, *Thielavia basicola*.

These beds had not been treated with steam nor disinfected with formalin solution as a preventive measure. While the soil had been partly changed from year to year it was noticed that where the roots penetrated into the old soil the disease developes rapidly. While experienced growers of bright tobacco from Virginia claim to be able to grow plants successfully, continuously on the same soil, it has not been proven to be thus in our experience. Warne plants had been grown on this soil, which was partly changed each year for five successive seasons. The writer is fully convinced that to grow any variety of tobacco plant, commonly grown in Ontario, on the

same soil continuously is a risky practice. It was very evident that this soil, which is very fertile, must be disinfected before being used again, and it is doubtful if we shall use this soil in the future even after disinfection.

Burley Beds.—Burley beds were sown April 17, the same date as the Warne beds were sown. The soil and treatment were alike. The same diseased condition prevailed in this case, and the roots developed marked cases of tobacco root rot.

The balance of the area in Burley beds which was sown on new soil, April 21 and 23, did not show any signs of root rot; and it was noted that both the cotton and the glass-covered beds sown on the latter-mentioned date gave stronger and earlier plants than the first seeding. The Burley beds sown under glass, the soil previously well manured and fertilized at one-fifteenth of a pound per square foot with the combination of single fertilizers mentioned above, gave very strong healthy plants.

A cotton bed manured but not fertilized gave plants about ten days later than a bed with glass covering prepared in the same way and sown the same date.

Conclusions from Plant Bed Experiments.—1. From observation and past experience the writer would advocate sowing beds by April 1 to 10 if weather and soil conditions were favourable.

2. The practice of sowing beds continuously on the same soil more than two years is a risky one.

3. The glass covering gave plants about ten days earlier than the cotton covering.

4. The writer would advocate the disinfection of all tobacco beds, either by steaming or using a solution of formalin. The methods are explained in Bulletin No. A-6, Tobacco Division.

5. A combination of the single fertilizers sulphate of potash, nitrate of soda, and superphosphate mixed in equal proportions by weight and applied at one-twelfth of a pound per square foot gave excellent results as a plant bed fertilizer. To avoid any danger from burning the young germ, should sprouted seed be used, the writer would recommend applying the soda, say three to four days before sowing the beds.

EXPERIMENTS WITH VIRGINIA TOBACCO.

Five acres of Virginia Leaf was planted from June 11 to June 20. The ground was given a 500-pound application of a 3-8-3 combination of single fertilizers, which is a 3 per cent nitrogen, 8 per cent phosphoric acid, and 3 per cent potash. To 1 acre an application of complete ready-mixed fertilizer was given.

Immediately after setting, the poisoned bran mash was applied around the plants, and greatly checked the ravages of the cutworm. By subsequent replanting a very uniform stand was obtained.

The crop made splendid growth throughout the latter part of June and July, and it gave appearances of being the most uniform crop we had yet grown. One-half of the crop was ready for topping August 4. The balance of the area was about ten days later.

However, a very severe wind and hail storm passed over this section of the county on August 3, greatly damaging about one-half of the field. In many cases plants were broken off at the ground and scores of plants were practically stripped of their leaves, nothing being left but fragments of leaves on a badly beaten stalk. The later planting, being not so far advanced, seemed to grow out of the effects from the storm, and made a fairly good sample of tobacco. The earlier planted portion of the crop was topped fairly high, but the top leaves did not sufficiently mature to be ready for harvesting when the lower portion of the plant was ripe for cutting, consequently the very top leaves cured a rather dark red or greenish colour.

The plants most badly damaged were cut off, but the sucker which sprung up did not have time to grow and mature into a well-ripened plant. A few plants which were

cured had a thin textured leaf of greenish yellow cast. The crop was graded and the sound leaf was sold at 22½ cents per pound, while that badly torn with the wind and hail was sold for 10 cents per pound. Thus what promised to be a crop of first quality had an unforeseen but destructive accident, deducting from its value more than one-half.

BURLEY EXPERIMENTS.

The Burley ground was prepared from a clover sod, manured at sixteen spreader loads per acre, and fertilized according to the outline below. Part of the area was manured the fall and summer previous, and the balance of the ground was manured early in the spring. Ploughing was finished the last week of May, and the ground was immediately rolled with a weighted roller, and double disced. It was again double disced, harrowed smooth, and fertilized as follows:—

Plot No. 1, acre plot.—250 pounds sulphate of potash per acre, 400 pounds superphosphate per acre, 150 pounds blood meal per acre.

Plot No. 2, acre plot.—200 pounds sulphate of potash per acre, 300 pounds superphosphate per acre, 200 pounds blood meal per acre.

Plot No. 3, acre plot.—200 pounds basic slag (contains 18 to 24 per cent phosphoric acid) per acre, 200 pounds sulphate of potash per acre, 100 pounds blood meal per acre.

Plot No. 4, acre plot.—300 pounds superphosphate per acre, 200 pounds sulphate of potash per acre, 140 pounds basic slag per acre.

Plot No. 5, acre plot.—200 pounds nitrate of soda per acre, 200 pounds sulphate of potash per acre, 200 pounds superphosphate per acre.

Plot No. 6, acre plot.—200 pounds sulphate of potash per acre, 200 pounds basic slag per acre, 100 pounds blood meal per acre.

Plot No. 7, acre plot.—200 pounds sulphate of potash per acre, 200 pounds superphosphate per acre, 300 pounds blood meal per acre.

Plot No. 8, acre plot.—185 pounds sulphate of potash per acre, 240 pounds superphosphate per acre, 200 pounds Blood meal per acre.

Plot No. 9, acre plot, divided into six plots of equal size.—

No. 1, 200 pounds sulphate of potash per acre, 300 pounds nitrate of soda per acre, 300 pounds superphosphate per acre.

No. 2, 250 pounds sulphate of potash per acre, 350 pounds nitrate of soda per acre, 350 pounds superphosphate per acre.

No. 3, 300 pounds sulphate of potash per acre, 400 pounds nitrate of soda per acre, 400 pounds superphosphate per acre.

No. 4, 350 pounds sulphate of potash per acre, 450 pounds nitrate of soda per acre, 450 pounds superphosphate per acre.

No. 5, 400 pounds sulphate of potash per acre, 500 pounds nitrate of soda per acre, 500 pounds superphosphate per acre.

No. 6, 400 pounds sulphate of potash per acre, 550 pounds nitrate of soda per acre, 550 pounds superphosphate per acre.

HARROW.

COMMENTS.

In view of the fact that the combination 200 pounds sulphate of potash, 300 pounds acid phosphate, and 300 pounds nitrate of soda per acre, has given the best results in former years, the above outlined experiment was planned with the idea of finding out the effect of the heavier applications of phosphoric acid potash and nitrate of soda, and to find out if possible which one, if any, of the above combinations would give the largest net returns, after paying for the expense of the materials. In all cases the fertilizer was lightly harrowed in and the ground rolled before planting.

As will be noted in the experiments on 1-acre plots, nitrate of soda was applied in the case of No. 5 only. The remaining plots received a hand application of 350 pounds per acre on July 24. The idea in applying the soda by hand in the later dressing was to prevent any unnecessary leaching which might occur in case the material was applied in conjunction with the other single fertilizers. This operation, which on the face of it would look like an unusual amount of labour, required the services of three men but one day.

Likewise this crop suffered a severe set-back from the hail-storm, particularly the first planting. Over an area of 4 acres the lower six or eight leaves were so badly torn and broken that a large percentage of them were thrown away at stripping time. The later plantings, being smaller when the storm came, gradually grew out of the effects of the storm and made a very fair sample of tobacco.

Owing to the severe accident which happened to the crop, the writer did not consider it advisable to keep each plot separate in the field, or when taken into the barn. Since there was no really appreciable difference noted in the field, no accurate figures of yields per acre were kept for each plot.

TOBACCO ROOT ROT OBSERVATIONS.

While the most of our Burley crop was making a splendid growth previous to the storm, still there was a plot of 2 acres which was growing unevenly—it might be termed a partially Burley-sick soil. The observations the writer made in the field were as follows: Plants on certain rows or in certain rows in the field seemed to have completely stopped growing. The dwarfed plants were often attacked by the Mosaic disease, but sometimes the stunted or dwarfed plants bore no trace of this mottled appearance, but simply seemed to have stopped development.

This latter case applied to fields, the soil of which was still healthy at planting time, and the diseased plants have been taken from the diseased plant bed. But in the more exaggerated cases in other fields in the county the writer has noticed whole fields which presented a dwarfed appearance, in which case the disease has been prevalent in the field and has affected previous crops but was unrecognized. The writer considers that in the case in question on the Farm at Harrow the disease was transmitted from the infected plant bed to the field. The root system of many plants was so seriously affected that the feeding powers of the fine root hairs were cut off so completely that the plants were merely surviving on a limited supply of plant food. Undoubtedly this disease has been prevalent in many fields which have been closely cropped with Burley and it has never been recognized. One must admit that a case is difficult to diagnose unless you are thoroughly conversant with the symptoms. The writer would suggest that the grower should feel at liberty to send any diseased specimens to the Experimental Farm, Harrow, or to Mr. F. Charlan, Tobacco Division, Ottawa, for inspection and identification. The situation is not improving, and if we were to study the facts as expressed by many growers, "My ground is burleyed out," "I shall have to grow a crop which is easier on the soil," we would find in many cases that the soil was infected with root rot. We might substitute the Burley with other varieties of smoking tobacco as Connecticut Seed Leaf, Big Ohio, and Comstock

HARROW.

Spanish, which are more resistant, but the market for such varieties is not favourable and even these kinds become badly affected.

Mr. James Johnson, a plant pathologist from the College of Agriculture, Madison, Wisconsin, made no hesitation in calling the disease *Thielavia basicola*. We have planned to co-operate with him in trying to breed a resistant strain of Burley by sowing different types of seed selected in 1913 from fields in Essex county. It is believed that through a process of selection and breeding a disease-resistant strain can be worked out.

PRECAUTIONARY MEASURES.

First.—The soil of the seed-bed which produced sick plants in 1913 must be either discarded or steamed for twenty to 30 minutes with pressure at 100 pounds. To treat the bed area, secure a pan the width of your beds, 8 to 10 feet long, and 4 to 6 inches deep. A serviceable and inexpensive pan can be made by securely nailing galvanized roofing to four pieces of 2- by 4-inch oak scantling, and soldering the seams so that no steam may escape. Have an intake in the form of a short piece of galvanized pipe securely fastened in one corner of the scantling frame; one handle on each side of the pan would make it more convenient to handle.

The writer saw some beds last spring prepared and cared for alike, but part of the bed area was disinfected with steam and a portion left not treated. At the time of his visit there was at least 3 inches difference in the growth of the plants. In short the untreated portion gave promise of being a failure, while the treated area was producing healthy seedlings with very little work required in weeding the beds.

Second.—Adopt a longer rotation, say, corn, cereals, clover, followed twice in succession before planting Burley on the soil. The above precaution applies particularly to an area of ground which has been frequently used for Burley tobacco.

Third.—The year previous to planting, apply 1,000 pounds superphosphate per acre, since this fertilizer will counteract the most rapid development of the organism which causes the disease in the soil.

Fourth.—Let the farmer consider as diseased a field on which a very uneven growth of tobacco was observed in 1913 and be convinced that growing tobacco continuously on the same soil is a risky and exhaustive practice.

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